PROJECTING ECONOMIC ACTIVITY OF A REGION USING AN INPUT-OUTPUT MODEL

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PROJECTING ECONOMIC ACTIVITY OF A

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SUMMARY

The main concern of this paper has been to develop an Input-Output model for a 17-county area in the Northeast Georgia Area for 1972. The 29-industry model presented here was developed with actual earnings and employment data and with the input-output relations of Georgia for 1970.

The I-O model as a forecasting model was compared with other regional forecasting techniques and a forecast of gross outputs and employment by industry for the study area was made using input-output.

Finally, the role of I-O analysis in regional development planning was discussed.

The presentation is in the following format:

Chapter I presents the general I-O model and related terminology and a discussion of I-O theory from different economic-mathematical viewpoints. Chapter II introduces other regional forecasting techniques--linear regression, export-base theory, econometric modeling, and shift-share analysis. Advantages and disadvantages are presented for each method. Chapter III concentrates on presenting the I-O model as a forecasting technique. Requirements for an input-output forecast are given as well as a discussion of causes of input coefficient instability. Empirical tests extracted from the literature give some insight into the implication of the coefficient-stability assumption when forecasting with static I-O models.

Chapter IV offers a description of the selected 17-county region is given

in terms of four economic variables -- population, employment, personal income, and per capita income. The sales and purchasing patterns of industries in the region are given as well as the commuting patterns of workers. The chapter concludes with a brief shift-share study based on earnings, using the U. S. as a comparison for growth.

Chapter V presents an aggregated five-industry I-O model of the study area; multipliers are reported and a brief discussion of how the model was constructed is given.

Chapter VI is mainly concerned with the 1980 I-O forecast of the area's gross outputs and employment.

Chapter VII outlines the steps required in regional development planning and the role of I-O in the planning process.

Appendices A and B present the detailed description of the model construction and the 29-industry I-O model for the area in 1972, respectively.

CHAPTER I

INPUT OUTPUT THEORY

1.1 The Traditional I-O Model

The conventional I-O model represents an economy consisting of n interacting industries. The static, open model that is presented in this study, is based upon three fundamental assumptions (15, p. 34):

I. Each group of commodities is supplied by a single industry.

II. The inputs to each industry are a unique function of the level of output of that industry.

III. There are no external economies or diseconomies.

Each industry purchases inputs from other industries, from households (labor), and from outside the region (imports). In turn, each industry sells its products to other industries (as intermediate products) and to the final demand sectors (as final products): households, businesses, government and foreign trade.

Figure 1 is a representation of an I-O model that has been divided into four sections or quadrants:

Quadrant I: This section of the model represen-s the purchases by the final-demand sectors from the "selling" industries listed at the beginning of each row. In Figure 1, the C_i are the household expenditures in products of industry i, I_i are the business investment expenditures in industry i, G_i are the government (local, State, and Federal) expenditures in the i^{th} industry, and E_i are exports from the i^{th} industry.

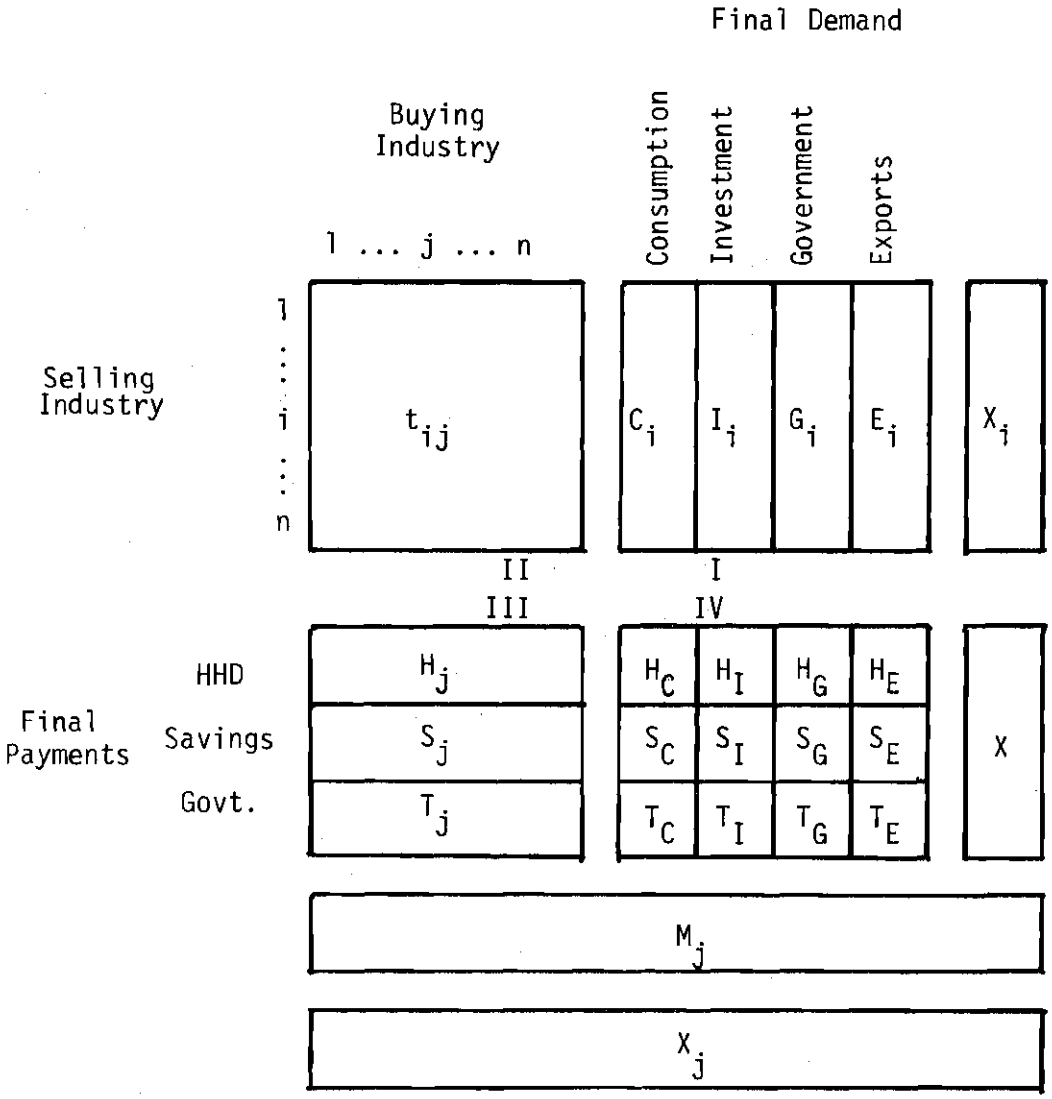


Figure 1. The Interindustry Accounting System.

Quadrant II: This section represents the interindustry transactions, i.e., the sales of products from industries listed at the beginning of each row to the industries listed at the top of each column. In Figure 1 the t_{ij} are those transactions, usually given in producer's prices (54, p. 25), from industry i to industry j. The X_i represent the the total gross outputs of industry i, i.e., the sum of interindustry sales and sales to final demand sectors across row i.

Quadrant III: This section represents the final payments from industries listed at the top of each column to the final-payment recipients: households (wages), businesses (profits), and governments (taxes). From Figure 1 we note that H_j represent household income from an industry j, S_j are the capital residual of industry j, and T_j represent the taxes or government income paid by industry j. The X_j represent column sums and usually include imports so as to obtain total inputs for each j.

Quadrant IV: This section represents the non-market transfers between households, businesses, and government. In Figure 1, H_f are the transfers from final demand sector f (where f = consumption, investment, government, and exports) to households, S_f are the transfers from final-demand sector f to business capital residual accounts, and T_f are transfers from final-demand sector f to governments.

Basically, the I-O model is a theory of production where final demand for the product of each industry is an exogenous variable and where the interindustry transactions are the endogenous variables. The general problem of I-O models is to determine the levels of production in each industry which are required to satisfy the given level of final demand.

Finally, I-O models present:

1) production and distribution characteristics of individual industries in the region;

2) the nature of the interrelationships among these industries themselves and among these industries and other economic sectors.

The major contribution of input-output analysis is that it permits the measurement of the industrial repercussions of changes in demand. I-O analysis traces this complex chain reaction throughout the entire industrial structure and measures the effects of all the demands, both direct and indirect, on the output of each of the industries.

1.2 The Regional I-O Model and the National I-O Model

Although the general format of the I-O model, as discussed in section 1.1, remains the same at the regional and national levels, the major distinction between the two is the relative instability of regional input coefficients.

In a regional economy, the coefficient instability is attributed to the dynamic nature of the "trade coefficient." Trade between regions, i.e., imports and exports, are relatively large compared with those in the nation and trade patterns tend to change more rapidly.

The regional input coefficient can be thought of as having two components: p_{ij}, the proportion of industry j's total inputs which it buys from regional and extraregional industry i, and r_{ij}, or the trade coefficient, is the proportion of industry j's purchase from industry i that was made within the region.

It is likely that, in the case of a change in technology, the p_{ij}

is subject to change, while in the case of a change in the purchasing pattern of an industry j, i.e., if the industry buys its inputs from regional rather than extraregional suppliers, then the trade coefficient, r_{ij}, is subject to change. At the national level, we would expect both components to change relatively little through time with the trade coefficient changing even less as the nation becomes more self-sufficient. In contrast, regional patterns of input purchases are subject to change as local producers of inputs begin operations.

1.3 Mathematics and the I-O Model

With the information presented in the previous sections it is possible to state that for any industry i, the following holds true:

Intermediate sales + Sales to final demand = Total gross output

Let us define, then, t_{ij} as the transaction or sale of goods and services from industry i to industry j; f_{ik}, to be a sale from industry i to final demand sector k; and X_i, to be the total output of any industry i. In equation form, we have

$$\sum_{j=1}^{n} t_{ij} + \sum_{k=1}^{q} f_{ik} = X_i, \quad i = 1,2,\ldots,n \tag{1.1}$$

where, n = number of industries,

q = number of final demand sectors.

In order to reduce the number of unknowns in this set of linear equations, "production functions" must be defined. Therefore, inputs to industry j, t_{ij}, are defined explicitly as being proportional to X_j, the

level of gross outputs of industry $\underline{j}$. In equation form, we have:

$$t_{ij} = a_{ij}X_j, \quad \text{for all } \underline{i} \text{ and } \underline{j} \tag{1.2}$$

where the a_{ij} are the proportionality constants known as the production or input coefficients.

Now, for each industry $\underline{i}$ let $f_i = \sum_{k=1}^{n} f_{ik}$; substituting this and equation (1.2) into (1.1), we have

$$\sum_{j=1}^{n} a_{ij}X_j + f_i = X_i, \quad i=1,2,\ldots,n \tag{1.3}$$

Expanding (1.3), we have the following system of linear equations:

$$\begin{aligned}
a_{11}X_1 + a_{12}X_2 + \ldots + a_{1n}X_n + f_1 &= X_1 \\
a_{21}X_1 + a_{22}X_2 + \ldots + a_{2n}X_n + f_2 &= X_2 \\
\vdots \qquad\quad \vdots \qquad\quad & \qquad \vdots \quad \vdots \\
a_{n1}X_1 + a_{n2}X_2 + \ldots + a_{nn}X_n + f_n &= X_n
\end{aligned} \tag{1.4}$$

Rewriting (1.4) in order to solve for X, we have

$$\begin{bmatrix} X_1 \\ X_2 \\ \vdots \\ X_n \end{bmatrix} - \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \\ \vdots \\ X_2 \end{bmatrix} = \begin{bmatrix} f_1 \\ f_2 \\ \vdots \\ f_n \end{bmatrix} \tag{1.5}$$

In matrix notation, we have

$$\underline{X} - \underline{AX} = \underline{F} \tag{1.6}$$

and

$$\underline{X}(I - \underline{A}) = \underline{F} \tag{1.7}$$

Now, for any given set of final demands, $\underline{F}$, the set of n simultaneous linear equations can be solved for the total gross outputs, X_i, required by each industry i using the following equation,

$$\underline{X} = (\underline{I} - \underline{A})^{-1} \underline{F} \tag{1.8}$$

where $(I - A)^{-1}$ is known as the Leontief inverse, in recognition to W. W. Leontief, the originator of input-output economics.

1.4 Macroeconomics and the I-O Model

Macroeconomic models are usually concerned with describing the circular flow of monies between the various purchasing sectors: households, businesses, government, and foreign trade (19, p. 28). This idea can be expressed clearly in equation form where national income equals the sum of the demands of the four purchasing sectors,

$$Y = C + I + G + (X - M), \tag{1.9}$$

where, Y = national income;

C = consumption expenditures;

I = intended investment;

G = government expenditures;

X = exports;

M = imports;

(X-M) = net exports.

The national income and product accounts provide the necessary accounting framework for measuring the money flows between sectors. Referring to Table 1, it is possible to observe that the left side shows the total factor and non-factor costs of producing the current output, i.e., it shows the manner in which the various charges against the total value of the flow of product were allocated to the items of cost and profit. The product account, on the right side, shows the value of final goods and services distributed according to the purchasing sectors. Referring to equation (1.9), the left side corresponds to the income accounts while the right side of the equation represents the product account.

Now, looking back to the I-O model depicted in Figure 1, we observe that quadrants I, III, and IV correspond directly to the income and product accounts with the added feature that income and expenditures are disaggregated by industries from which payments were received in exchange for goods and services provided and to which disbursements were made in exchange for goods and services, respectively.

Hence, the I-O model can be described as a detailed or disaggregated macroeconomic model; however, in our particular application, we are modeling a small, open economy, and therefore, the underlying assumptions will be derived from export-base theory. Nevertheless, the I-O model constructed for our region will maintain the qualities of a macro model insofar as it reports regional income and product accounts and follows the equilibrium condition that demand (interindustry and final demand deliveries) must equal supply (total inputs).

National income and product account, 1970 (Billions of dollars)

Wages, salaries, supplements		$573	Personal consumption expenditures		$618
Employer contributions for social insurance		30	Durables	$ 89	
Proprietor's income		67	Nondurables	265	
Rental income of persons		23	Services	264	
Net interest		33	Gross private domestic investment		135
Corporate profits and inventory valuation adjustment		70	Residential construction	$ 30	
			Business fixed investment	102	
Profits tax liability	$35		Net change in inventory	3	
Dividends (domestic)	25		Net export of goods and services		3
Dividends (foreign)	*		Government purchases of goods and services		219
Undistributed profits	11		Federal	$ 97	
Foreign branch profits	4		State and local	122	
Inventory valuation adjustment	−5				
National income		$798			
Indirect business taxes		90			
Charges against net national product		$888			
Depreciation		87			
Charges against gross national product		$975	Gross national product		$975

*Less than $0.5 billion.

Source: U.S. Department of Commerce, *Survey of Current Business, July, 1971,* U.S. Government Printing Office, Washington, 1971.

Table 1. U.S. Gross National Product Accounts.

1.5 Export-Base Theory and the I-O Model

Export-base theory provides a framework of analysis for the purpose of explaining a region's economic growth. The main assumption of the theory is that exports are the sole autonomous item of expenditure, all other expenditures are defined as functions of regional income. The implication of the theory is that a small, open economy such as a substate region, requires an export base (export sales) to survive or exist economically. (For a large economy, such as the U. S., the theory obviously breaks down because exports are small relative to interindustry transactions and sales to other sectors of final demand).

The theory (59, p. 17), in equation form, can be expressed as:

$$Y = E + X - M , \tag{1.10}$$

where, Y = regional income

E = local expenditures

X = exports

M = imports

Furthermore, let

$E = eY$, where e = marginal propensity to consume;

$M = mY$, where m = marginal propensity to import;

$X = \overline{X}$, i.e., autonomous.

Substituting these definitions into (1.10), we obtain,

$$Y = eY + \overline{X} - mY . \tag{1.11}$$

Simplifying,

$$Y(1 - e + m) = \overline{X} \tag{1.12}$$

$$Y = \frac{\overline{X}}{(1 - e + m)} . \qquad (1.13)$$

Differentiating Y with respect to $\overline{X}$, we obtain,

$$\frac{dY}{d\overline{X}} = \frac{1}{1 - p} , \qquad (1.14)$$

where p = e-m, the marginal propensity to consume local goods. The derivative in (1.14) is the change in regional income due to a change in export income, this is otherwise known as the economic-base multiplier.

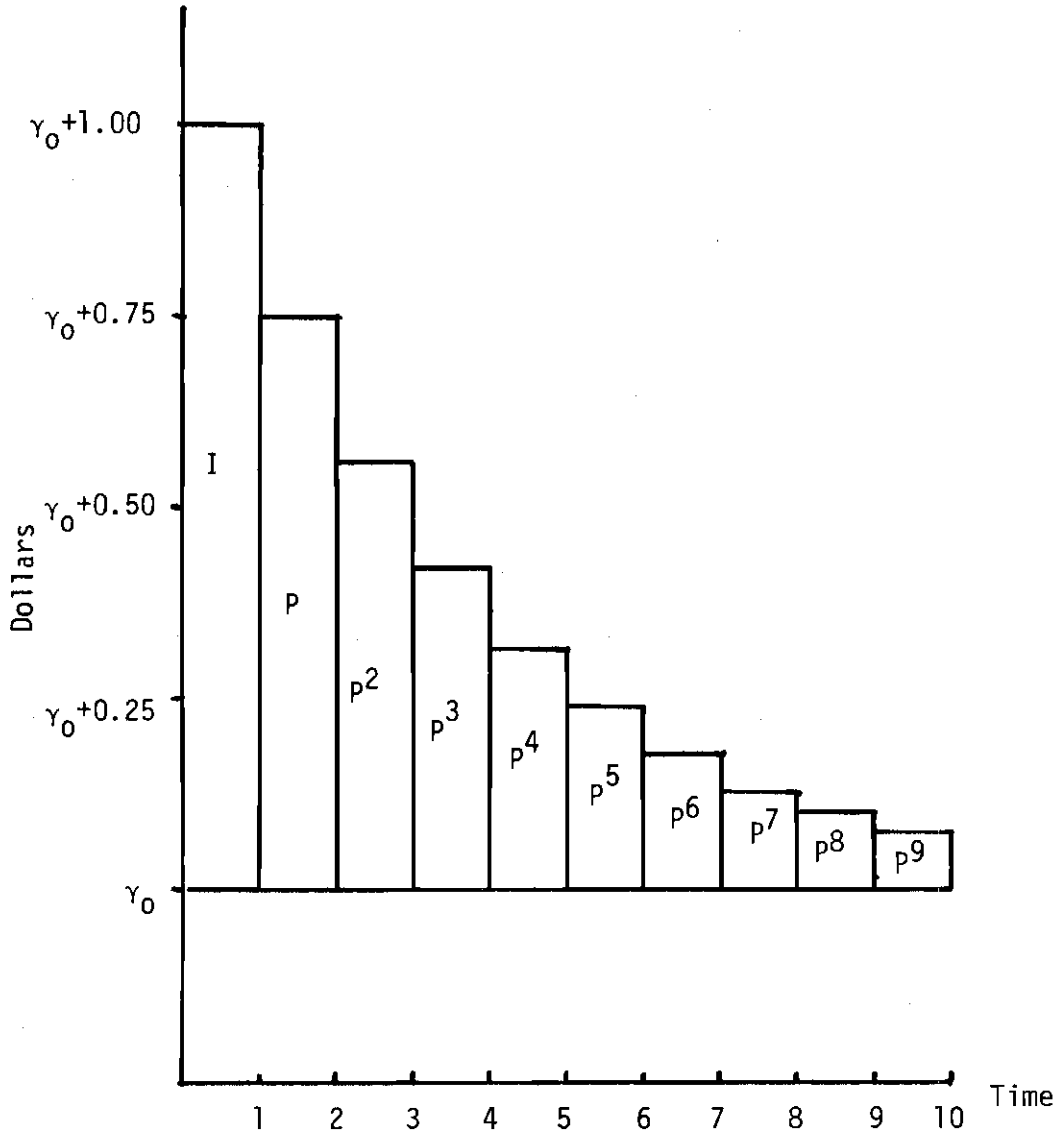
Repercussions of changes in the level of exports on total income can be estimated through the use of multiplier concept. Economic-base multipliers are aggregate multipliers which fail to distinguish between the industries in which the initial expenditure changes originate and which fail to determine the direct and indirect effects of the initial export income change will have on each industry. Therefore, the economic-base model determines, through the use of the appropriate multiplier value, the total change in regional income (output or employment) due to a change in the demand from a single export sector (aggregated export sales).

I-O models, however, as we shall see in the next section, report a matrix of industry multipliers, the Leontief inverse, implying that the total impact on regional income will vary according to the industry in which the initial change occurs. Therefore, I-O models for small regions can be described as disaggregated export-base models; insofar as they yield multipliers reported for each industry detailed in the inter-industry matrix.

1.6 Multipliers and the I-O Model

In the previous section, the economic-base multiplier was defined as $1/(1-p)$, where p is the marginal propensity to consume local goods. In order to illustrate the concept of the multiplier, suppose that sales to an export sector from local industries were to increase by \$1. According to the definition of the multiplier, total income in the region should increase by $\$1 \times (1/(1-p))$, i.e., if $p = .75$, regional income would increase by \$4. Now, the question is where did the \$4 come from if the initial "injection" into the economy was \$1? The total increase in regional income occurs through time and in succeeding "rounds" of expenditure as illustrated in Figure 2. At time 0, regional income increased by \$1 due to the increase in export sales, then, at time 1, the first expenditure of this "new" income occurs (say, wages are paid to employees). Because p is the propensity to consume local goods, the amount of money remaining in the system is $\$1 \times p = \$.75$, the remaining \$.25 "leaks" out of the system (through imports). Then, at time 2, $\$1 \times p \times p$ are respent in the region. In every succeeding time period, p percent of the preceding expenditure is respent within the region until the initial effect of the \$1 increase is zero. Since p is less than one, and this will almost always be the case when referring to an open economy, the amount respent becomes successively smaller, this can be understood by considering a power series expansion: $p^0 + p^1 + p^2 + p^3 + \ldots p^n$, where n is a large number.

Total expenditures in the region can be found by summing the initial injection and the succeeding rounds of expenditure; i.e., $\$4 = \$1 + \$.75 + \$(.75)^2 + \$(.75)^3 + \ldots$; this is verified from the fact that



Source: (19, p. 107)

Figure 2. The Multiplier Effect.

the expansion, $1 + p^1 + p^2 + p^3 + p^4 \ldots$ will sum to $1/(1 - p)$ as $p \to \infty$, the economic base multiplier.

Analogously, the Leontief inverse, derived in section 1.3, has similar interpretations. $(\underline{I} - \underline{A})^{-1}$ is the summation of the series expansion $\underline{I} + \underline{A}^1 + \underline{A}^2 + \underline{A}^3 + \ldots$, where the identity matrix, I, represents the initial dollar increase in sales to final demand by the j^{th} industry, and the A matrices are the matrices of production coefficients as defined in equation (1.2). I-O models supply the user with multipliers for each industry in the region and they represent total output required (or total income or employment generated) in all industries as a consequence of a $1 increase in sales to final demand from industry $\underline{j}$.

1.7 Summary

From the preceding sections, it is possible to conclude that, in general, regional I-O models:

--Provide unique solutions to a set of simultaneous linear equations; i.e., given a vector of final demands and the appropriate Leontief inverse, total gross outputs required by each industry in an economy to meet a specified final demand can be determined uniquely.

--Provide income and product accounts for the region disaggragated by industries.

--Provide output, employment, and income multipliers disaggragated by industries.

CHAPTER II

REGIONAL FORECASTING TECHNIQUES AND THEIR ASSOCIATED PROBLEMS

2.1 Introduction

In this chapter various techniques will be presented which, to some extent, are used for forecasting regional economic activity. Brief descriptions of the methods, their uses, advantages and disadvantages are presented for the following methods: linear regression, econometric models, export-base models, shift-share analysis, and I-O models.

2.1.1 Linear Regression Method

Linear regression consists of fitting a straight line to time-series data for such dependent variables as population, employment, and industrial output, with time (in years) as the independent variable. The major assumption of the method is that whatever happened in the past will continue to happen in the future. For example, if industrial output were found to be growing at 10% per year in the last five years, then, five, or even ten years from now, output would continue to increase at 10% per year.

The main use of linear regression models is to forecast long-term trends rather than short-term occurrences. This is because there may be unusual variation in the short run, while in the long run, a trend of either growth or decline may exist.

The advantages of the method are that it is simple and easy to use. On the other hand, this simplicity becomes its major disadvantage, it is too simple. Some dependent variables cannot be explained in terms of straight-line equations and most dependent variables do not grow or decline forever, as the theory assumes.

2.1.2 Econometric Method

As yet, relatively little work (11,12,23,72) has been done on econometric models of regional growth, the majority are concerned with national growth. However, several regional models have been made and their main use is for forecasting short run changes in the area's economy.

Econometric models employ time-series data and multiple regression to define the relationships between economic variables; several inter-dependent equations are used in a model.

Due to the fact that econometric models are used for forecasting national economic growth and because national growth is usually forecast for the short-term, econometric models at the regional level are also used for short-run forecasts.

Econometric models offer a compromise between export-base and input-output forecasting by providing more information than the former at a lower cost than the latter. Furthermore, econometric models are conceptually appealing in that they provide causal ordering of the exogenous and endogenous variables. Through the use of simulation, it is possible to investigate the results of different input values of the exogenous variables.

The major drawbacks of the method are: 1) due to their considerable

degree of aggregation, they are designed to predict or explain the behavior of a relatively small number of variables; 2) they are designed to offer only short-run forecasts and regional forecasts should be long-run because the narrowing of the interregional growth and income differentials are long rather than short run objectives; and 3) there exists a data problem in that some of the data available are for periods shorter than proposed projection periods, and some data are available too late.

2.1.3 Export-Base Method

The key element in export-base forecasting is the export-base multiplier. Although the multiplier was defined as 1/(1-p) in Chapter I, a more intuitive definition would be,

$$\text{E.B. Multiplier} = \frac{\text{Total Employment}}{\text{Basic Employment}}$$

in terms of employment alone.

When projecting employment in a region, an assumption must be made with regard to stability of the multiplier through time. Schaffer found that for Atlanta, for example, the economic base multiplier remained constant between 1961 and 1970 at 3.3 (66, p. 14). Hence, given a stability assumption like this, it is possible to proceed and estimate employment at some future time period.

Projections of basic and non-basic employment are used to determine changes in area population, income, land use and tax base. In turn, these forecasts of area growth (or decline) are used in planning to meet a wide range of public and private needs.

Advantages of the method are that it is simple, the model is inexpensive to produce, and it does not require large amounts of data. Drawbacks are that it is oversimplified, does not report sufficient information, and as has been discussed in Chapter I, the multipliers do not trace indirect or induced effects to specific industries.

Examples of export base projection models are limited, see (7,73).

2.1.4 Shift-Share Analysis Method

Shift-share analysis (3,21,57) divides growth in a regional economy into two distinct parts: Share, or the national growth component, and Shift, which consists of the regional share and industrial-mix components.

The national growth component explains part of the growth that occurred in the regional industry j by assuming that its employment (output) grew at the same rate as the national average for all industries combined. That is,

$$NG = E_j(US^*/US) - E_j = E_j\,((US^*/US)-1)\ , \qquad (2.1)$$

where, NG = National growth component;

E_j = Regional employment in industry j at the beginning of the period;

US* = Total national employment at the end of the period;

US = Total national employment at the beginning of the period.

The industrial-mix component explains the growth that occurred in industry j caused by structural change, e.g., demand patterns or technological change, in the region as compared to the all-industry national

growth rate. That is,

$$IM = E_j \left((US_j^*/US_j) - (US^*/US)\right) , \qquad (2.2)$$

where, IM = Industrial mix component;

US_j^* = National employment in industry j at the end of the period;

US_j = National employment in industry j at the beginning of the period.

The regional-share component explains the employment in the regional industry j resulting from that industry's growth as faster or slower relative to the national industry j. That is,

$$RS = E_j \left((E_j^*/E_j) - (US_j^*/US_j)\right) , \qquad (2.3)$$

where, RS = Regional share component'

E_j^* = Regional employment in industry j at the end of the period.

Total growth in employment in regional industry j is then:

$$TG_j = NG_j + IM_j + RS_j \qquad (2.4)$$

where, any of the components of total growth may be either positive or negative.

When using shift-share to project economic activity, it becomes necessary to forecast both the national employment by industry and the regional-share component. In the former, what is required, is a forecast of productivity and final-demand changes in all industries at the national level over the projected period. In the latter, an assumption regarding the stability of the regional-share component over time must be made. This is done by investigating causal variables related to the regional-

share component over time must be made. This is done by investigating causal variables related to the regional-share component such as distance from the market centers, comparative advantaged over other regions such as low labor rates and abundance of natural resources, quality of infrastructure, financial inducements offered by local and national governments, among others.

Therefore, shift-share analyzes and forecasts economic growth or decline in the region using national average growth rates as a basis for comparison.

This method has clear advantages over constant share methods of regional analysis which assume that the region under study maintains its share of national markets at the end of the forecasting period as it had at the beginning or base year. Furthermore, the technique permits the identification of the results of factors: 1) operating more or less uniformly nationally (even though the impact may vary with the region); and 2) operating more or less specially in a particular region (57, pp. 64-65).

Finally, shift-share's greatest advantage is its ability to place regional growth in a national perspective, "eliminating the narrow view that often results from comparing the performance of a state or regional economy to its own performance in some past period or to some closely linked geographical area" (21, p. 215).

The drawbacks to the method are that (9,10,33): 1) it is unable to identify the impact on regional growth of changes in industrial composition during the time period under consideration; 2) since it is not a causal model, shift-share does not explain why growth and growth

differentials occur in the nation or in the region, thus, this method only organizes information and creates a framework for further analysis; 3) because shift-share is a non-statistical technique, there is no way of determining whether the observed shifts are significantly different from zero. Moreover, it assumes that the regional and industrial effects on growth are independent; 4) arbitrary assumptions must be made about the stability of the regional-share component when supporting data is not available.

2.1.5 Input-Output Method

Basically, an input-output forecast is made by pre-multiplying a projected final demand vector by the Leontief inverse for the region. The product is a vector of gross outputs, disaggregated by industry, required to meet future final demand.

Theoretically, as will be shown in the next chapter, more realistic forecasts are obtained by projecting not only final demands but also by projecting both input and trade coefficients.

The most desirable feature of I-O forecasting, therefore, is that it traces out the interindustry effects in the region given a change in the final-demand vector. The major drawbacks are that I-O models are time-consuming and expensive to build and regional forecast models require a great deal of data if projections of input coefficients are desired; and require virtually non-existent data if trade coefficients are to be projected. For examples, see (30, 32, 53, 64, 76).

2.2 Problems of Forecasting: General and Regional

Forecasting problems, in general, occur because of the following

reasons: 1) inherent uncertainties of a free market system (as opposed to a centrally planned economy) result in the fact that not all of the forces affecting both production and consumer demand can be measured statistically, e.g., prices; 2) all statistical techniques are subject to errors of observation and measurement as well as purely random disturbances. Hence, projections of economic activity will be subject to a margin of error.

Regional forecasting is difficult because of the openness of the region and the resulting lack of data measuring regional transactions or flows of goods and services. It is usually the case where the regional analyst must select a region for which published data are readily available or, in its absence, he must supply proxies for missing or incomplete data. Regional models are, therefore, at the mercy of published data; primary data can be obtained but it is rather expensive.

CHAPTER III

INPUT-OUTPUT AS A FORECASTING TECHNIQUE

3.1 Introduction

In order to obtain the proper perspective for analyzing I-O forecasting, a distinction will be made between impact studies and forecasts using I-O models.

Impact studies are concerned with "predicting the impact of expansion (or decline) in a few sectors, the introduction of new firms or industries, simulation and feasibility experiments; in regional forecasting our main preoccupation is with predicting over-the-board changes in final demand..." (60, p. 159). Hence, regional forecasting is mainly concerned with predicting the changes of the entire economy.

In this chapter, requirements for an I-O forecast are presented and causes of coefficient instability and empirical tests of coefficient stability are discussed.

3.2 Static and Semi-Dynamic I-O Models

The reason for comparing static and semi-dynamic models is that there exists a direct relationship between the length of the period to be projected and the number of structural parameters, or dependent variables, that are allowed to vary through time. Thus, in static I-O models, the structural parameters -- input and trade coefficients -- are assumed (and maintained) constant over time, while in semi-dynamic models,

these same parameters are allowed to change through time. Therefore, static models should be more useful for short-term forecasts since parameters do not have a chance to change.

In semi-dynamic I-O models, the interindustry matrix is allowed to change over time, i.e., the input and/or trade coefficients are changed prior to forecasting. Semi-dynamic I-O models are useful for long-term forecasts, and, perhaps more realistic than static models.

The static and semi-dynamic models have requirements for forecasting which are (60, p. 160):

1) The input coefficient matrix, A;

2) Regional projections of final demand to a terminal year;

3) Predictions in the changes of the A matrix; and

4) Predictions of shifts in trade coefficients for regional industries.

A static I-O model used for forecasting purposes will make use of the first two requirements listed above, a semi-dynamic model would use all four requirements.

In the sections that follow, we will be concerned with explaining the methods actually used to obtain projections of final demand, input coefficients and trade coefficients.

3.3 Final Demand Projections

Forecasts made with I-O static models will be as accurate as the final-demand projections that are utilized. The usual procedure is to obtain a set of industrial growth rates, which when multiplied by the final-demand vector produces a set of final demands at some future time

period. There is a heavy reliance on projections of national industry growth rates due to the fact that they are readily available and more accurate. In order for these growth rates to be useful at a regional level, we must assume that the region's major industries serve national markets, i.e., regional industries grow at the national averate rate for that industry.

Assumptions regarding the share of the regional industry's market over the forecast period produce two different projections of final demand. In the former, regional industry j maintains a constant share of the market during the forecast period, in the latter, variations in the original share of the market is allowed.

Using national growth rates as a basis for forecasting regional final demands provides, in most cases, crude estimates of gross outputs. However, the projections are relatively easy to calculate, and until more regional data and regional forecasting techniques become available, this remains the easiest solution, given scarce resources for investigation.

There are two distinct approaches to final demand projection:

1) Projecting aggregated final demands;

2) Projecting individual final demand components.

3.3.1 Projecting Final Demand as a Whole

In this case, final demands from each purchasing sector -- households, investment, government, and foreign trade -- are projected as a single sector, final demand, for each industry j. Constant- or shift-share methods are used in order to project the aggregated final demand sector.

3.3.2 Projecting Individual Final-Demand Components

In this case, each final-demand sector is forecast separately for each industry, i.e., household final demands for industry j are projected, then investment, then government purchases, and finally exports. Projecting final demand in this manner becomes much more difficult because of the lack of regional income and product accounts, export or interregional data, etc. The usual approach, then, is to "close" the I-O model with respect to as many final-demand sectors as possible and project the remaining final demands.

The procedure of closing the model with respect to a final demand sector consists of transferring the corresponding rows and columns of the sectors to be closed into the interindustry matrix.

It is possible to transfer the household, investment, and local government final-demand sectors into the interindustry matrix without altering the assumption that outputs are dependent on the level of inputs. Exports and federal government expenditures, of course, cannot be made endogenous, because the level of expenditures of the former are not dependent on the sum of all export expenditures and in the latter case expanditures are not dependent on income or taxes received from the region.

3.4 Input Coefficient Projections

In order to use the I-O model for long forecasting periods, it is desirable to investigate the possibilities that changes will occur in the input coefficients. Hence, the objective is to obtain a revised form of the input coefficient matrix in the terminal year of the forecast.

To determine whether the changes in input coefficients are of sufficient magnitude to alter significantly the vector of total gross outputs at the end of the forecast period, the causes of coefficient variation will be discussed; this will be followed by a brief presentation of the results of studies concerning coefficient stability.

3.4.1 Causes of Input Coefficient Change

For purposes of exposition, the following causes of coefficient change have been identified in the literature (60, 68, 82):

1) Technological Change: A change in the physical requirements for the specific goods and services used in producing a given good. For example, the changeover from glass bottles to aluminum cans in the beverage industry would cause a change in the coefficients in the beverage-industry column and the rows associated with the sale of glass and aluminum.

Furthermore, the effects of technological change not only causes changes in the coefficients, but it may require an entirely new set of row and column coefficients for an industry which had to be "created" as a result of a change in technology.

2) Product-Mix Variations: This consists of change in the product composition of an individual industry over time and arises out of the aggregation procedures required in I-O analysis. Product-mix variations may occur independent of technological change because they are more dependent on say, market demand for a particular industry's product. However, when the outputs of different products grow or decline at different rates, the input coefficients will change, unless weights attached

to each constituent product are changed accordingly.

3) Relative Price Changes: If the relative prices of the factors of production change during the period of projection, then it is possible that the input coefficients will change. This will usually occur when some inputs can be substituted for others, e.g., of the price of an input rises, then that input will be substituted (if technologically possible) for another input whose price is lower.

Substitution of inputs is not limited to raw materials; costs of high labor may be substituted for lower costs of equipment. Import substitutions occur mainly because of the local availability of previously or presently imported products at a lower cost (assuming also that the quality of the local product is comparable to that of the imported product, and that the local producer is as dependable as the foreign producer).

4) Economies of scale (34, pp. 123-187): The input coefficients are most likely to be affected by economies of scale during the early stages of an industry's growth except when they are combined with advances in the technology of that field. Furthermore, the coefficients are likely to be affected by a) localization economies, i.e., external economies occurring to an industry as a result of like-producing units aggregating at one point; b) urbanization economies, i.e., external economies resulting from unlike-producing units aggregating at one point.

5) Non-Linearity of the Production Function: Although it is assumed in I-O analysis that each input to an industry $\underline{j}$ be a linear, homogeneous function of that industry's output, a strict proportional relationship may not necessarily exist and this can cause differences in

input relationships between two time periods.

6) Differences in methods of Model Building: This is a purely "mechanical" cause, usually encountered when using more than one published I-O table as reference, and is largely due to differences in data sources and statistical methods for estimating the technical relationships of the I-O model being built. Different levels of aggregation and particular conventions that are adopted when constructing the I-O model may cause different input coefficients to be produced.

7) Aggregation: This may cause instability in that when two or more sectors with different coefficients for the same input are combined the aggregate coefficient will be the average of the coefficients of the individual sectors; the average will depend on the relative weight of the production in each sector. When these weights vary, the average coefficient will vary even if the individual coefficients are constant.

3.4.2 Factors Contributing to Coefficient Stability

Although there exist many causes of coefficient change there also exists in the economy forces that contribute to coefficient stability. Harmston and Lund (28, p. 38) consider custom, habit, and inertia as stabilizing forces in that industry, in general, is slow in changing over to new processes, and new equipment because of the expense required; businesses are likewise reluctant to change suppliers of input materials because of custom. Moreover, the intercommunity mobility of people and businesses in response to new or better opportunities also act as stabilizing forces in that people take their habits with them; spending habits tend to remain stable in a community under the assumption that people

coming into the region have the same spending habits as those already present. The final effect of these spending habits is to lessen expansion by current local industries, thus limiting the economies of scale effects.

As was seen in the previous section, aggregation contributed to coefficient instability, however, Sevaldson (68) found that aggregation also contributes to coefficient stability. He proposes that industries producing substitutable products will frequently be combined upon aggregation, and, therefore, the coefficients of the combined industry are expected to be more stable than the coefficients of the individual industries. The result of his test conducted with Norwegian data was that "when moving from a 79-sector table to a 14-sector table, there is a drastic reduction in the standard deviations about the average coefficient (for that industry) and, for most of the coefficient classes, there are further reductions upon moving from a 14-sector model to a 5-sector model" (68, p. 236).

3.4.3 Tests of Coefficient Stability

Leontief (42, pp. 17-52) was the first to investigate the effects of structural change in the I-O model. The I-O tables investigated were those for the United States for the years 1919, 1929, 1939. The results of his studies are summarized in Table 2 and also shown graphically in Figure 3.

From Table 2, for example, it is possible to observe that when comparing the 1919 I-O table to the 1929 table, 48.76% of the coefficients varied less than 20% and between 1929 and 1939, 35.92% of the coefficients

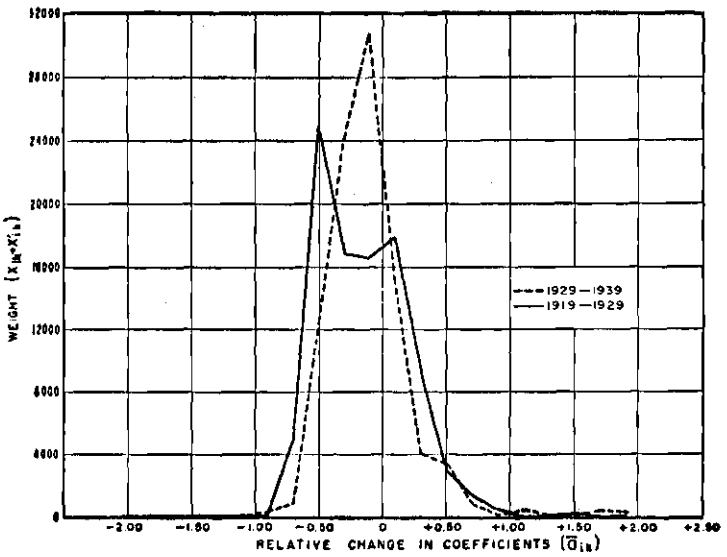
Table 2. Relative Changes in Technical Input Coefficients for the U.S. 1919-1929 and 1929-1939

Relative Changes in the Technical Coefficients (%)	Weights and Percentage Distribution of Weights of Input Coefficients by Relative Changes			
	1919-29	%	1929-39	%
-2.10 to -1.10	115.5	0.12	102	0.106
-1.10 to -0.80	348.7	0.37	76.3	0.08
-0.80 50 -0.40	13371.97	14.16	29792.6	30.87
-0.40 to -0.20	24058.4	25.48	16889.8	17.50
-0.20 to 0	30920.2	32.75	16688.3	17.29
6 to 0.20	15118.0	16.05	17972.9	18.63
0.20 to 0.40	4137.9	4.38	9637.3	9.99
0.40 to 0.80	4539.9	4.81	4478.9	4.64
0.80 to 1.10	344.1	0.36	439.1	0.45
1.10 to 2.0	1468.2	1.55	590.2	0.61
	94422.87		96482.1	

Table 3. Percentage Distribution of Weights of Input Coefficients by Relative Changes for Japan, 1951-54

	1951-1954
-2.1 to -1.0	2.1
-1.0 to -0.5	3.3
-0.5 to -0.2	9.1
-0.2 to 0	26.3
0 to +0.2	50.6
+0.2 to +0.5	7.2
+0.5 to +1.0	0.7
+1.0 to 2.0	0.6

Source: (15, p. 160)



Source: (42, p. 29)

Figure 3. Weighted Distribution of Relative Changes in Technical Input Coefficients for the U.S., 1919 1929 and 1929-1939.

varied in that same range. Hence, more variability occurred in the latter comparison. Furthermore, from Figure 3 we see that between 1919 and 1929, input coefficients were reduced on the average by 14% while during the 1929 to 1939 period, the reduction in the coefficients varied by 11%. (Negative relative changes can be loosely described as an increase in productivity.) The rate of change of the coefficients was closely related to the rate of technical progress; the rate being lower during the depression years as compared to the rate of growth in the pre-depression "boom" years.

Leontief concludes that input coefficients cannot be regarded as being stable over time, i.e., as production processes become more "efficient" (less inputs required to produce the same amount of output), the coefficients tend to decrease.

A similar study was conducted in Japan by the Ministry of International Trade and Industry, and the results reported in Chenery and Clark (15, p. 160) are shown in Table 3. In this case, almost 77% of the coefficients varied by less than 20%; better results were attributed to a shorter time period of comparison as well as higher quality I-O tables.

Sevaldson in aggregation study (68) mentioned earlier, concluded that "in the entire 79-sector I-O matrix studied, with more than 11,000 cells, there were 1500 non-zero coefficients of which only 6 intermediate input coefficients, 11 import coefficients, and 11 gross value added coefficients showed changes in trend values of one percentage point or more per year" (68, p. 234).

A similar conclusion was arrived at by Berman (1953) (15, p. 161). This study established allowable errors ranging from 3 to 100%, which

would not affect the usefulness of the tables, for testing the effects of war mobilization. All coefficients were increased by 100% and the effects of any changes were recorded. Out of the 10,000 non-zero coefficients found in the 190-industry I-O table for the U. S. in 1947, only 320 were identified as being sensitive to error. Although all industries were affected by changes in at least one coefficient, 134 industries affected by "drastic" changes in less than 5 coefficients and 176 industries in less than 10.

Arrow, et al., (2) and Carter (13) made time-series studies of input coefficients of the U. S. I-O tables. The general conclusions of the former were that input-output ratios (coefficients) show variations over time which are of significant magnitude. The variation, however, can be explained by a set of variables which influence the entire economic system (2, p. 126).

Carter (13, pp. 3-15) concludes that:

1) There is a consistency of greater productivity of labor and capital through time, hence, coefficients should decrease;

2) Total intermediate output required to produce a fixed final demand remains fairly stable and even increases slightly, implying that there exists a greater specialization due to technological change;

3) Large absolute changes in coefficients over the period, 1947-1958, were unusual; the relative frequency of large percentage changes in coefficients is attributed to the prevalence of small coefficients subject to large relative errors in the basic data;

4) Rapid technological progress within an advanced closed economy affects principally labor inputs; major changes in intermediate

inputs brought about by technical progress occur only among a few production sectors.

A test of the sensitivity of interindustry coefficients on the outputs of the industrial sectors of the Irish economy was conducted by Geary (22). In a series of three tests, effects of varying different coefficients on sector outputs were observed. The results showed that errors of twenty per cent in coefficients representing small flows gave rise to "acceptable" errors in estimates of outputs whereas, errors of ten per cent in coefficients representing large flows, such as in the household row, may produce serious errors in sector outputs.

A series of ten consecutive tables for the Netherlands (58), 1948 to 1957, were used in an indirect test of coefficient stability. It was found that the root-mean square prediction error for all industries combined was about 7.75% when the coefficients were those of the preceding year. When the time difference t was larger, the prediction error increased about proportionally to the square root of t. The high proportion of foreign trade in the Netherlands may, perhaps, account for some of the instability.

Finally, Carter (14), in a presentation at the Summer Proceedings of the American Marketing Association in 1968, showed the changes in the total outputs of all U. S. industries required up to deliver 1961 final demand with the input-output structures of 1939, 1947, 1958, and 1961. The results of these tests were that "for most sectors, total requirements change very gradually over time: orders of magnitude remain similar over the entire twenty-two year period" (14, p. 306).

Hence, at least for the national economy of a developed country such as the U. S., input coefficients tend to change very slowly, for regional economies, we would expect more instability due to faster-changing trade patterns and technology.

CHAPTER IV

THE NORTHEAST GEORGIA AREA: PRESENT AND HISTORIC ECONOMIC CONDITIONS

4.1 The Area: 1972

The area selected for study was a 17-county region in the Northeast section of Georgia. Rather than attempting to select a region more homogeneous in terms of data availability and economic measures, such as a region having a central node of activity (the Northeast Georgia APDC is a case in point), the region was predetermined as such in order to produce an I-O model for the area which coordinates with research on transportation and land-use planning being presently conducted at the University of Georgia under the supervision of Dr. Charles Floyd.

As can be observed from Figure 4, the area selected for study consists of the N. E. Ga. APDC along with 6 bordering counties. The counties in the area are: Banks, Barrow, Clarke, Elbert, Franklin, Greene, Gwinnett, Hall, Hart, Jackson, Madison, Morgan, Newton, Oconee, Oglethorpe, Rockdale and Walton.

In 1972, the area showed the following characteristics:

	Area	As % of U.S.	As % of Ga.
Population	423644	0.2034	8.975
Per Capita Income	$2969	79.68	91.29
Employment	164996	0.2992	8.2038
Total Personal Income	$1257734	0.1621	8.19

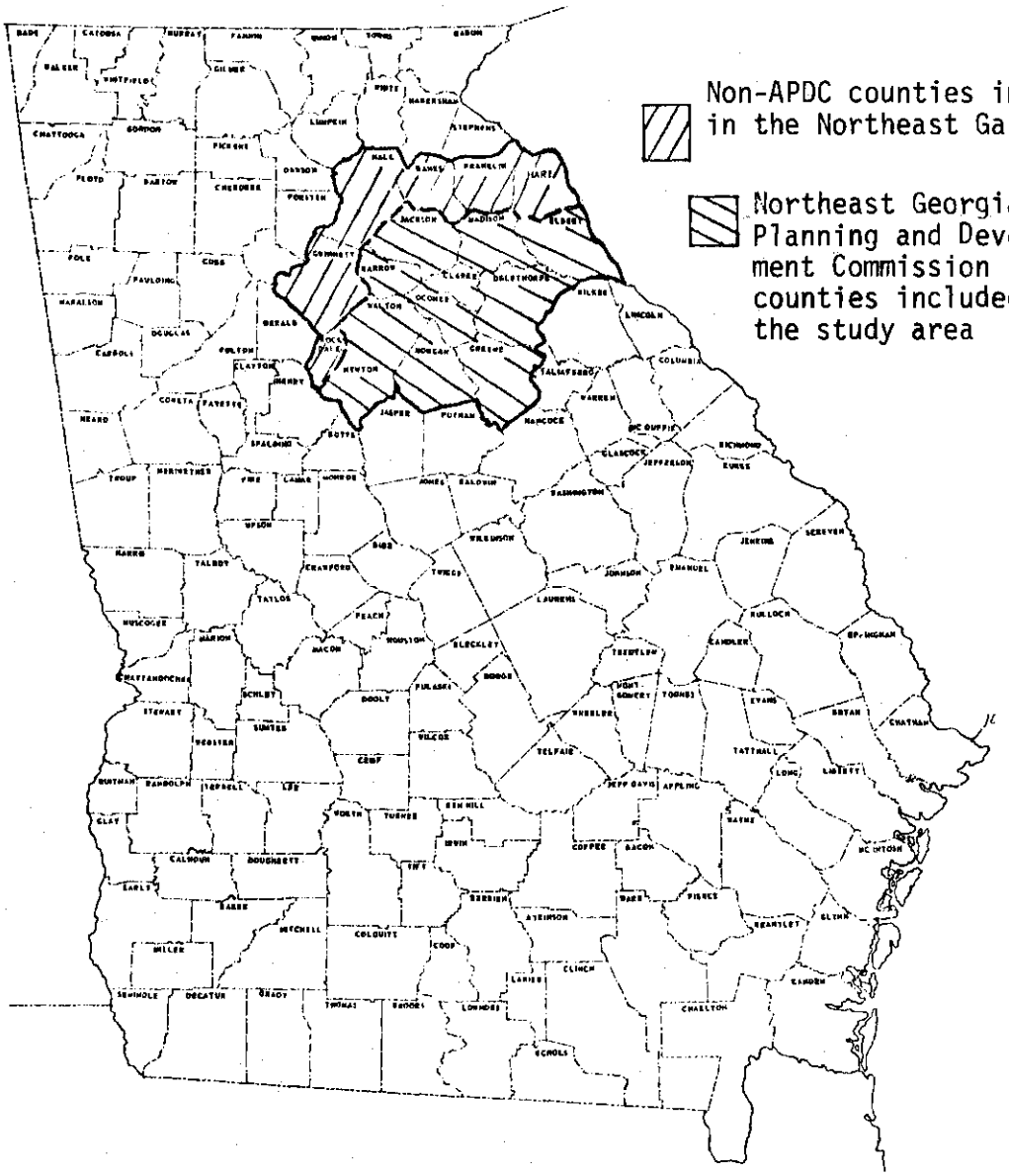


Figure 4. The Northeast Georgia Study Area (Cross-Hatched).

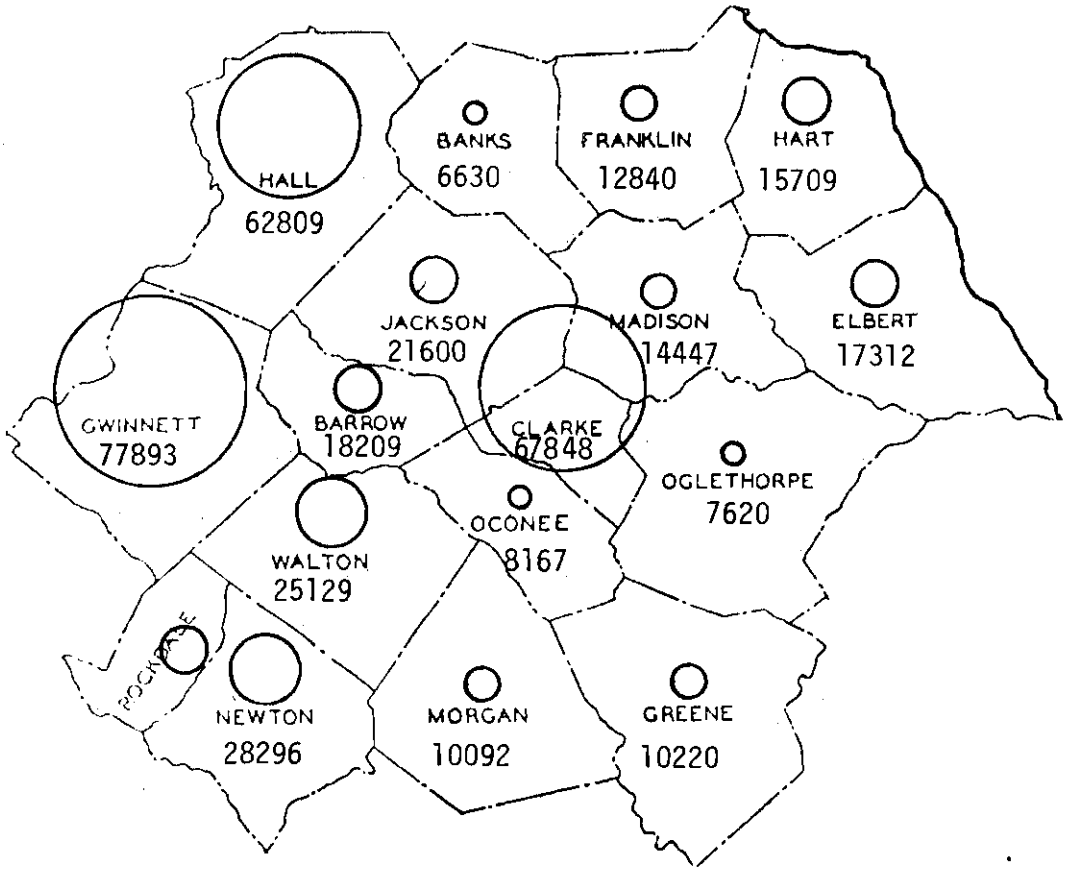
As can be seen, the area lags behind in per capita income when compared to U. S. and Ga. averaged. However, as will be seen in the next section, the area's growth rates are substantially higher than those of U.S. and Ga.

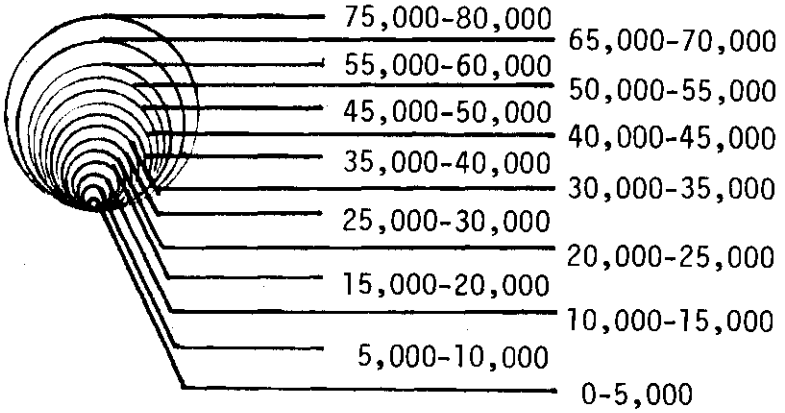
The maps in Figures 5 through 8 show the distribution of the area's population, employment and total personal income among the counties, and per capita incomes by county. Table 4 shows the per cent distribution by county, of population, employment and total personal income; per capita income in each county is shown relative to the area's average per capita income. It is interesting to note that Clarke, Gwinnett, and Hall counties combined account for 49% of the total population, 54% of the employment, and 57% of the total personal income in the area.

4.2 Area Growth: 1950-1970

In Table 5, population, per capita income, employment, and total personal income are shown for selected years between 1950 and 1970; Table 6 shows the area relative to the U.S. and Georgia in selected years. As can be seen, the area has a long history of lagging behind national and state averages of per capita income. Using the area's percentage of the nation's and the state's population as a standard of measurement, the relative position of the area in employment and total personal income can be observed to be likewise deficient. For example, in 1950, the area had 8.86% of Georgia's population but only accounted for 8.44% of its total employment and 7.4% of its total personal income.

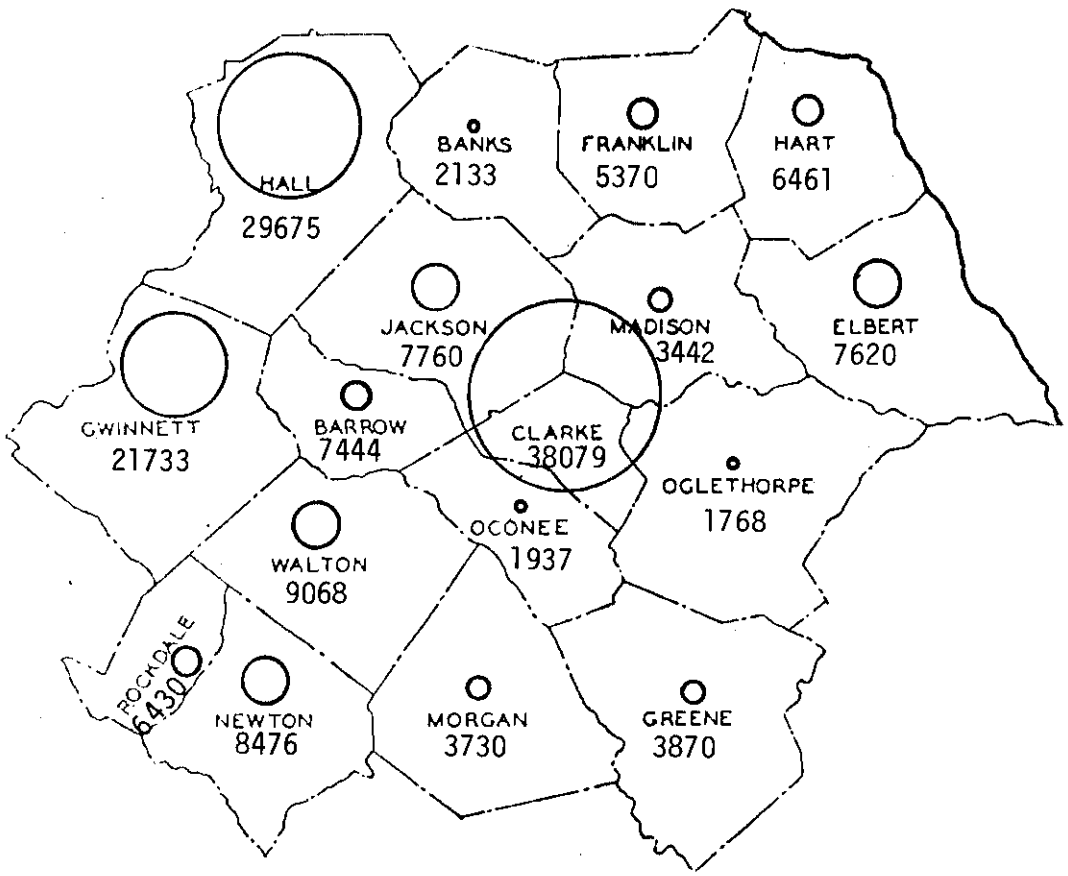
In terms of growth rates, the area begins to appear quite promising; Figure 9 shows growth rates during three periods -- 1950-1959, 1959-1970, 1970-1972 -- for the Area, U.S., and Ga. in terms of the four main

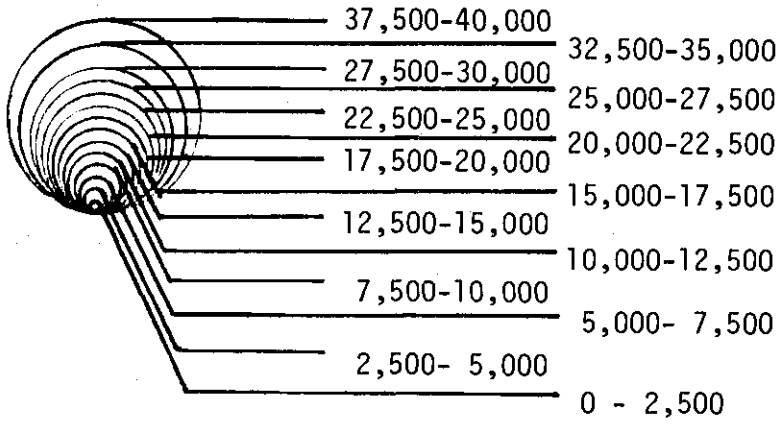




Source: (80,55)

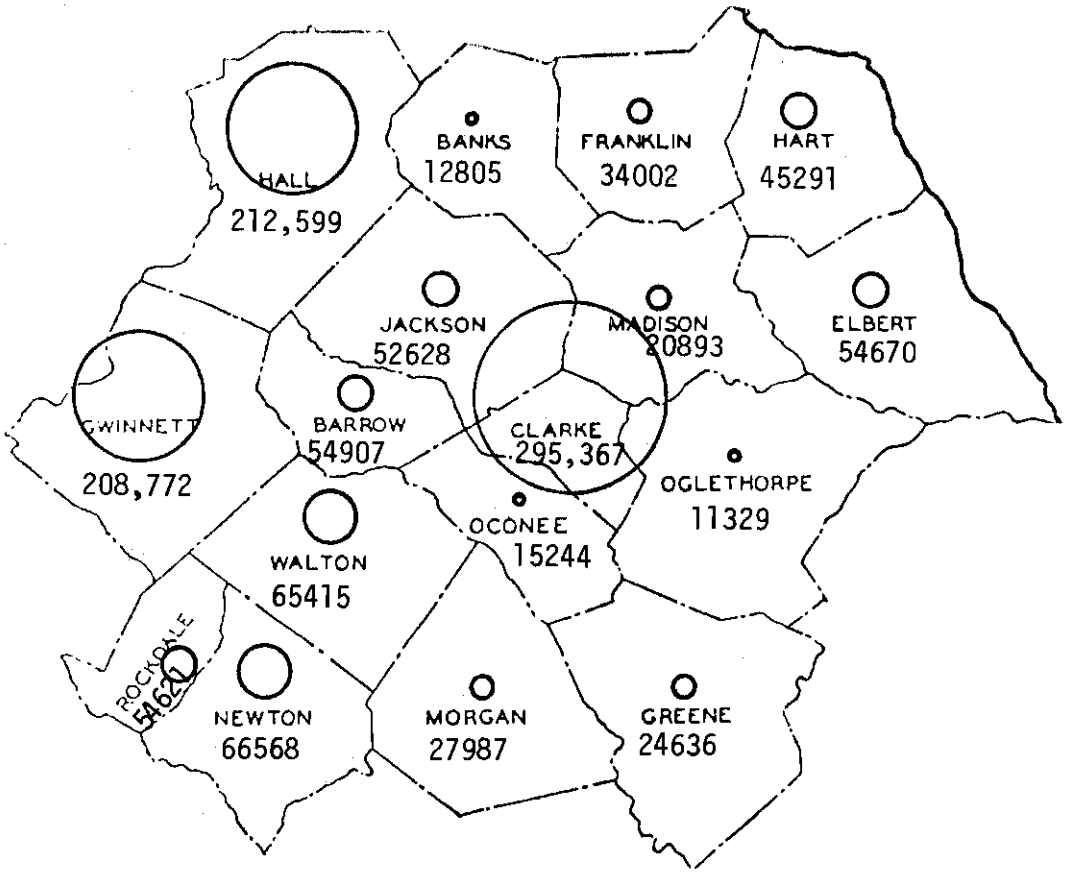
Figure 5. Area Population - 1972.

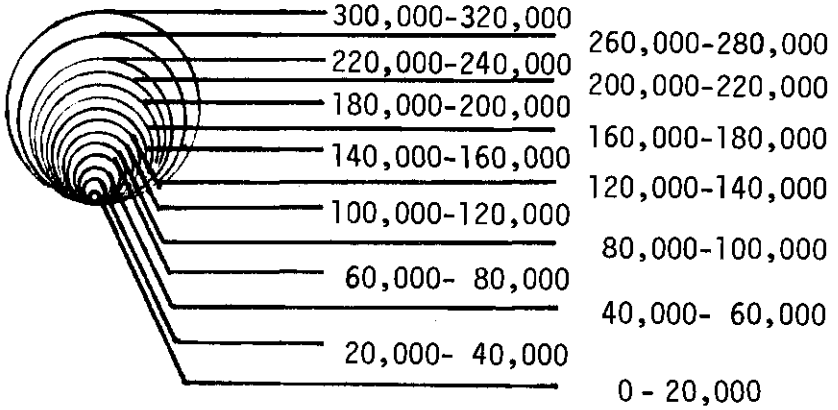




Source: (79,55)

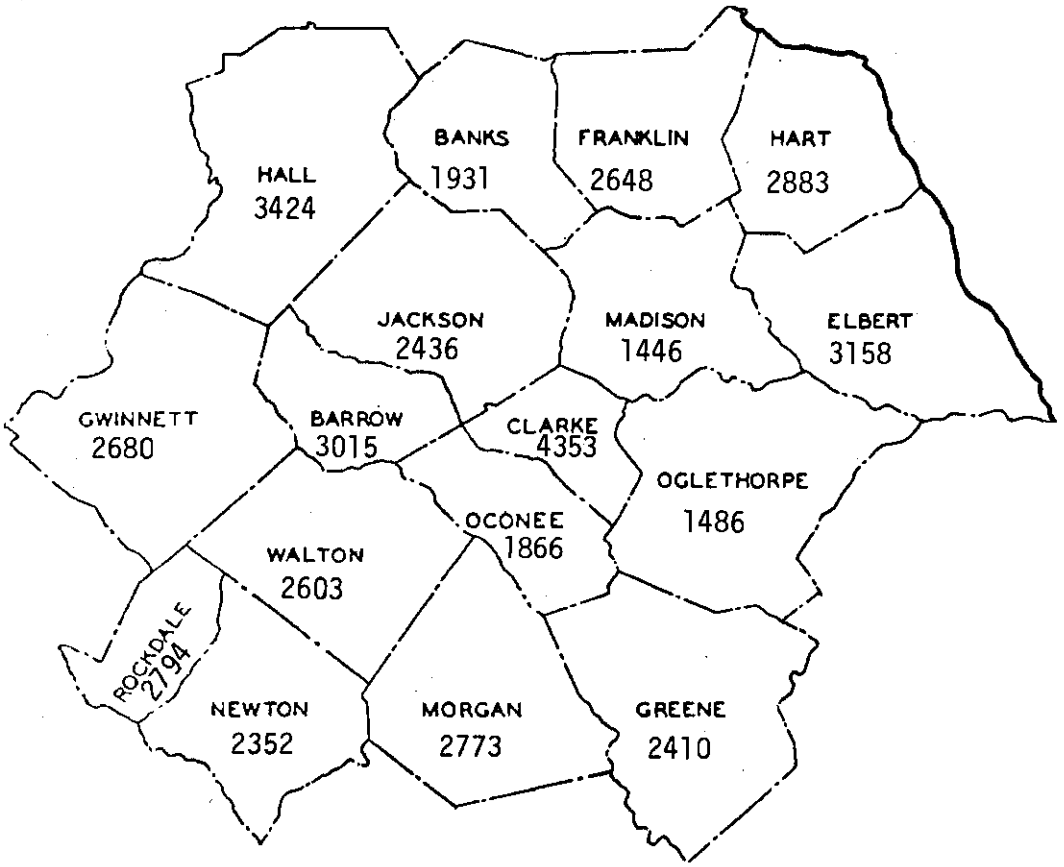
Figure 6. Area Employment - 1972.





Source: (55,79,80)

Figure 7. Area Total Personal Income - 1972



Source: (55,79,80)

Figure 8. Area Per capita Income - By County - 1972.

Table 4. Percentage Distribution of Population, Employment, Total Personal Income, and Per Capita Income by Area County, 1972

	County	% of Total Population	% of Total Employment	% of Total of Pers. Inc.	% of Avg. Area Per Capita Inc.
1)	Banks	1.565	1.293	1.018	65.05
2)	Barrow	4.298	4.511	4.365	101.56
3)	Clarke	16.015	23.078	23.484	146.63
4)	Elbert	4.086	4.618	4.346	106.37
5)	Franklin	3.031	3.255	2.703	89.2
6)	Greene	2.402	2.345	1.958	81.2
7)	Gwinnett	18.386	13.172	16.599	90.28
8)	Hall	14.656	17.985	16.901	115.33
9)	Hart	3.708	3.916	3.601	97.11
10)	Jackson	5.098	4.703	4.184	82.07
11)	Madison	3.410	2.086	1.661	48.72
12)	Morgan	2.382	2.260	2.225	93.41
13)	Newton	6.679	5.137	5.292	79.24
14)	Oconee	1.927	1.174	1.212	62.87
15)	Oglethorpe	1.798	1.071	0.901	50.08
16)	Rockdale	4.613	3.897	4.343	94.14
17)	Watson	$\frac{5.931}{100}$	$\frac{5.496}{100}$	$\frac{5.201}{100}$	$\frac{87.68}{100}$
Totals		423644	164996	1257734	2969

Source: (80)

Table 5. Northeast Georgia Area Historical Characteristics of Population, Employment, Total Personal Income and Per Capita Income, 1950, 1959, and 1970

	1950	1959	1970
Population	306422	319011	405592
Per Capita Income ($)	1183	1688	2621
Employment	109108	123158	152692
Total Personal Income	362577	538710	1063125

Table 6. Northeast Georgia Area as a Percentage of the U.S. and Georgia in Terms of Population, Employment, Total Personal Income and Per Capita Income, 1950, 1959, 1970

Area as a Percentage of the U.S.

	1950	1959	1970
Population	0.203	0.1801	0.1989
Per Capita Income	57.31	69.15	75.46
Employment	0.1898	0.1855	0.1925
Total Personal Income	0.1161	0.1246	0.150

Area as a Percentage of Georgia

	1950	1959	1970
Population	8.86	8.24	8.81
Per Capita Income	83.48	93.78	89.08
Employment	8.44	8.488	8.28
Total Personal Inc.	7.397	7.73	7.85

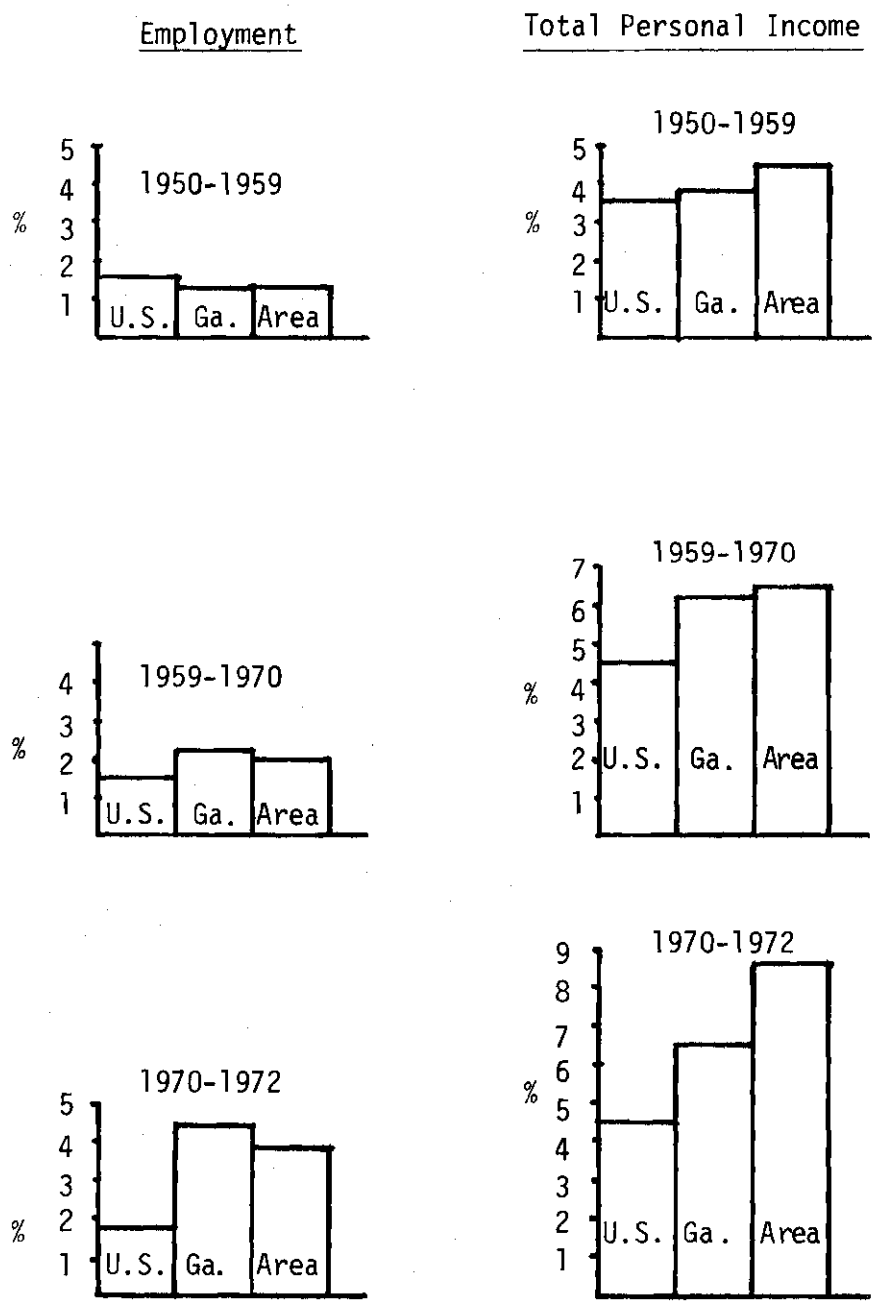
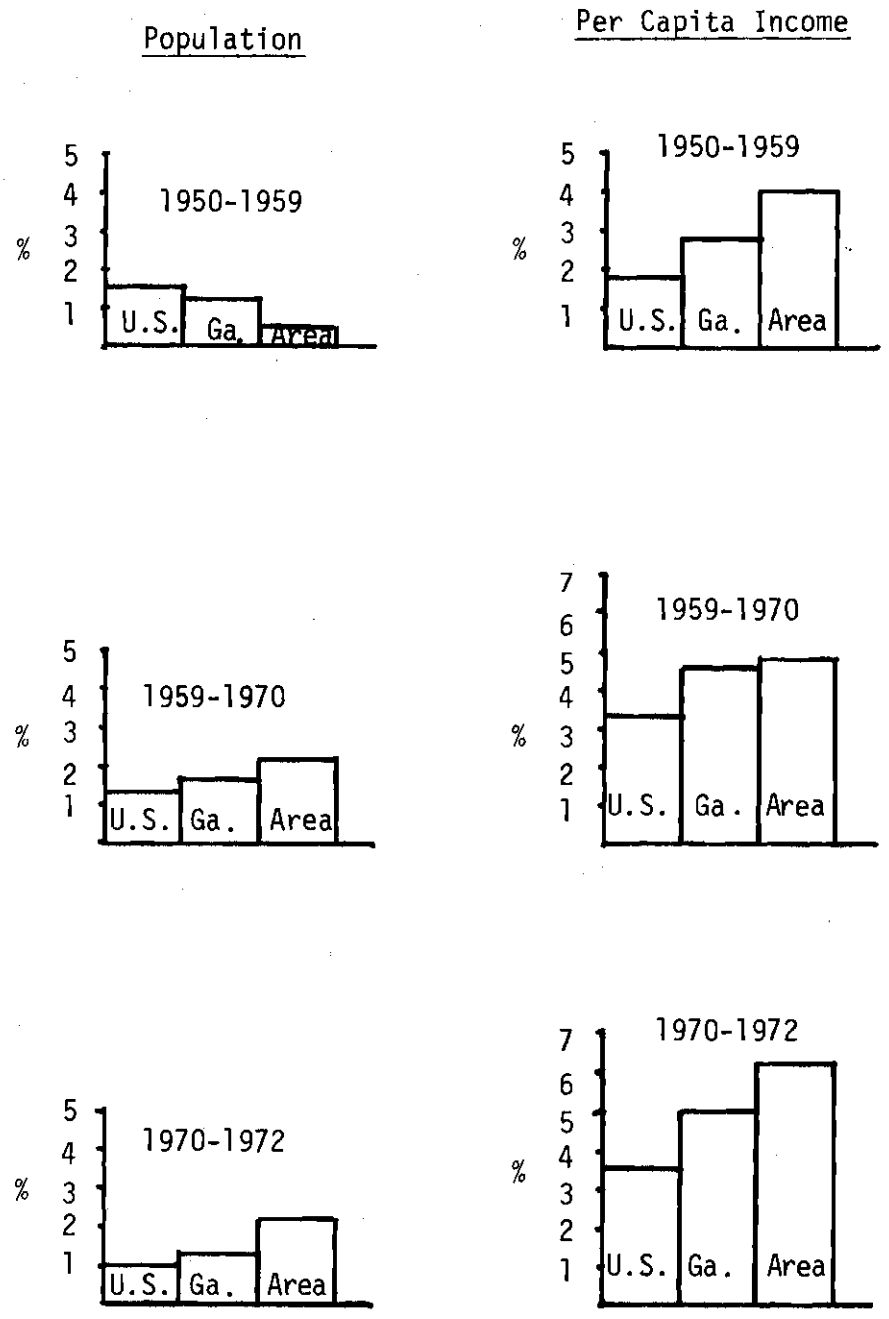


Figure 9. Annual Compound Growth Rates of Population, Employment, Total Personal Income and Per Capita Income for the Northeast Ga. Area, 1950-1959, 1959-1970, 1970-1972.

Source: (80)



Source: (80)

Figure 9. (Continued).

indicators -- population. Per capita income, employment, and total personal income. As can be observed, the area is attaining higher growth rates than the U.S. or Ga., especially in personal income.

4.3 Area Industrial Specialization

An area is said to be specialized (48, pp. 67-69), in a certain industry when this industry provides for a high proportion of the area's total employment or delivers a high proportion of the area's total income to its workers. The degree of specialization of an area can be measured by ranking employment (earnings) in major industries and then calculating what percentage each is of the total employment (earnings) in the area. Although employment or earnings can be used to measure specialization in an area, earnings specialization shows the actual dollar contribution the industry makes to the area's wealth. Figures 10 and 11 shows the area's specialization in graphical form. The area is relatively specialized in the manufacturing industry and therefore, additional specialization data for the manufacturing industry was obtained. Figures 12 and 13 show this graphically. Manufacturing employment is concentrated in the apparel and related products, textile mill products, and food and kindered products industries; these three industries account for more than 50% of the area's employment in manufacturing. Manufacturing earnings are concentrated in the same three detailed industries as shown in Figure 13.

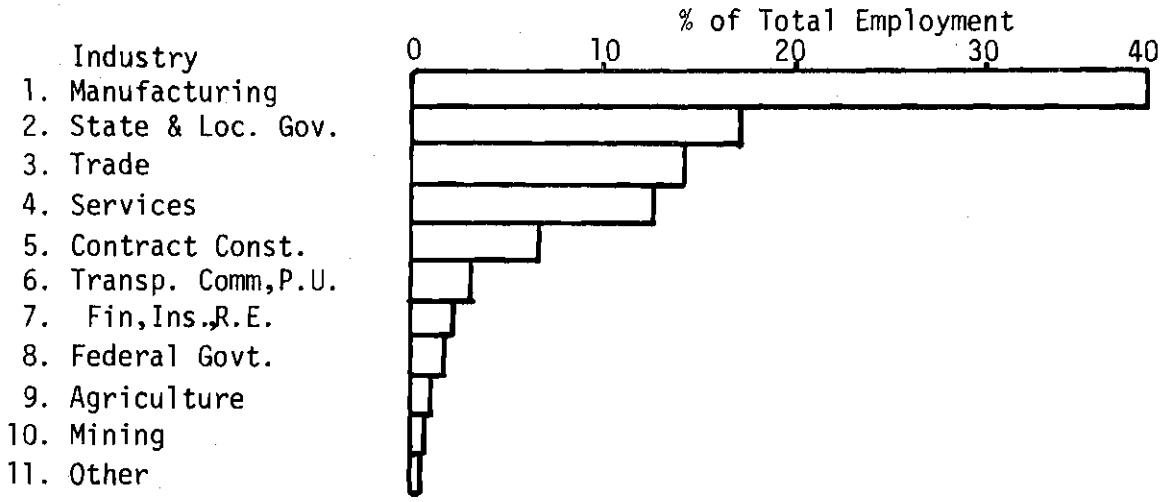


Figure 10. Employment Specialization in the Northeast Ga. Area by Industry, 1972.

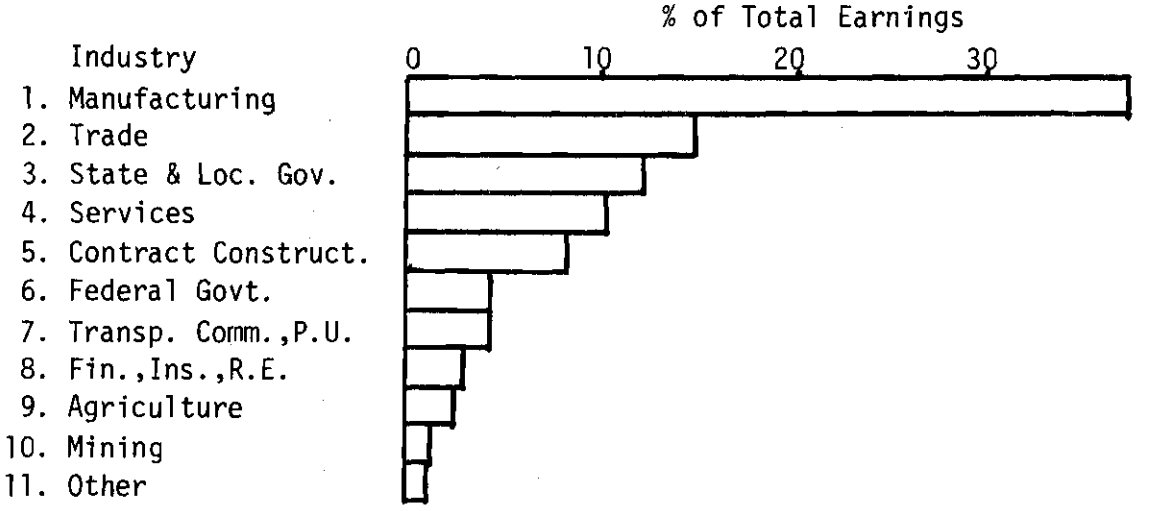


Figure 11. Earnings Specialization in the Northeast Ga. Area by Industry, 1972.

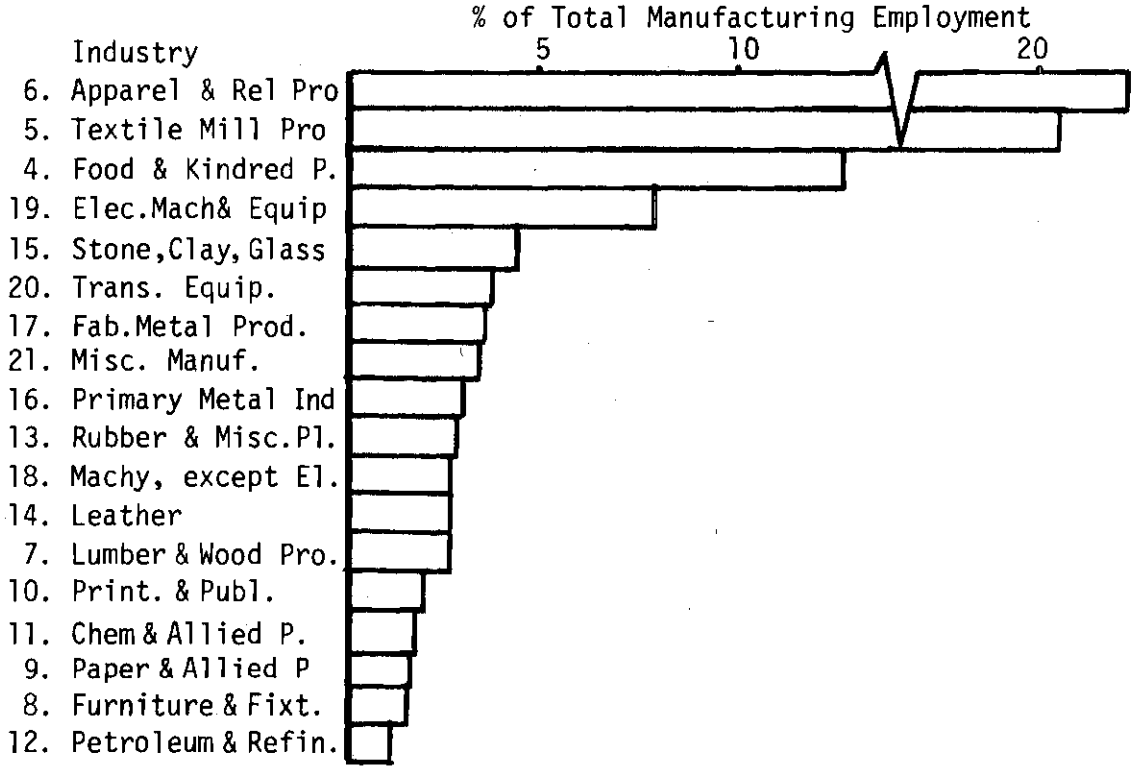


Figure 12. Manufacturing Employment Specialization in the Northeast Ga. area, 1972.

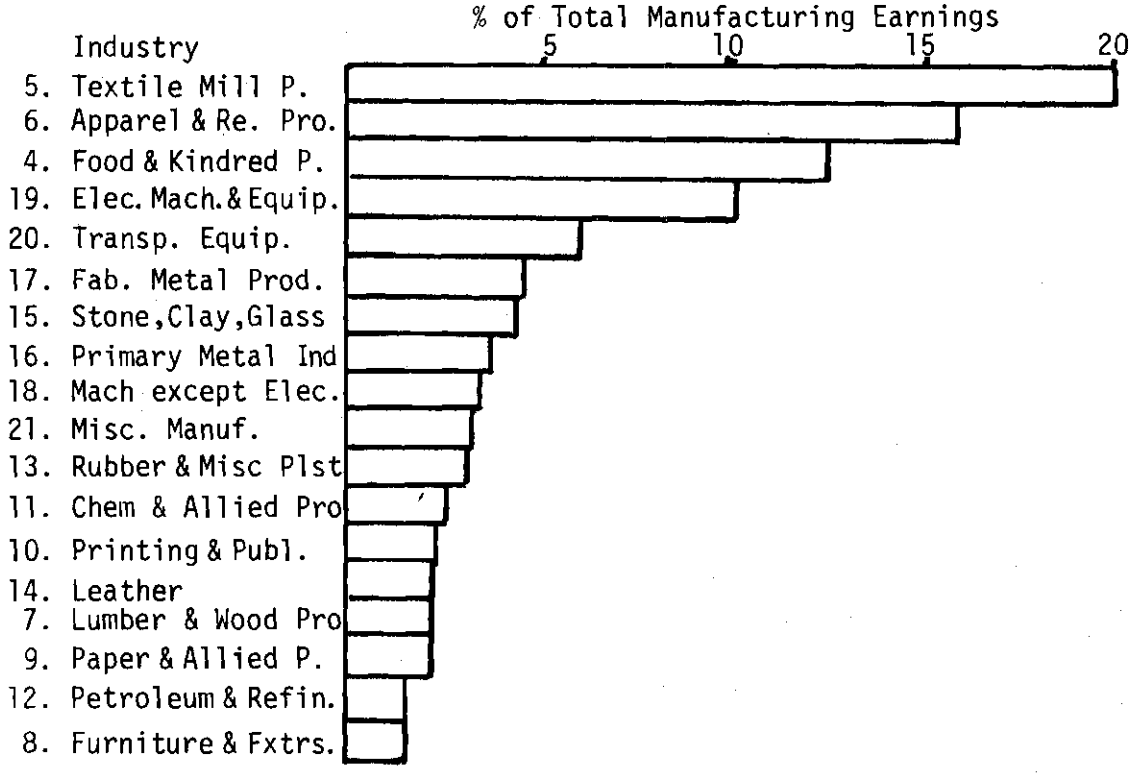


Figure 13. Manufacturing Earnings Specialization in the Northeast Ga. area, 1972.

4.4 Sales and Purchasing Patterns in the Area,[1] 1972

Figure 14 shows that although there are 19 industries in the region, which sell over 50% of their gross outputs to final demand sectors, only 9 sell over 50% to exports.

Figure 15 shows how industries depend upon other regional industries in order to sell their products. As would be expected, Agriculture sells over 80% of its total gross outputs as intermediated products to industries in the regions, and out of 925 million dollars of local sales in the area, agriculture sold $112 million or 12% of total local sales.

Figure 16 shows the relative importance of each industry in terms of being a "basic" industry in the area. Food and kindred products and textile mill products account for 30% of the area's export sales; exports by the food products industry amount to 59% of its gross output, while textile mills products exports 60% of its production.

Figure 17 shows how industries in the area depend upon other regional industries to purchase their inputs. Food and kindred products is heavily dependent on agriculture for its inputs, this being the main reason why it appears at the top of the list.

Figure 18 ranks regional industries according to their import activity. Food and kindred products appears again at the top of the list, however, it is worthwhile to note that this industry had a positive net export of 82 million dollars in 1972, and a total gross output of 332 million dollars.

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[1] Although the data reported in this section was taken from the I-O model presented in Chapter V, it is included here for completeness of presentation.

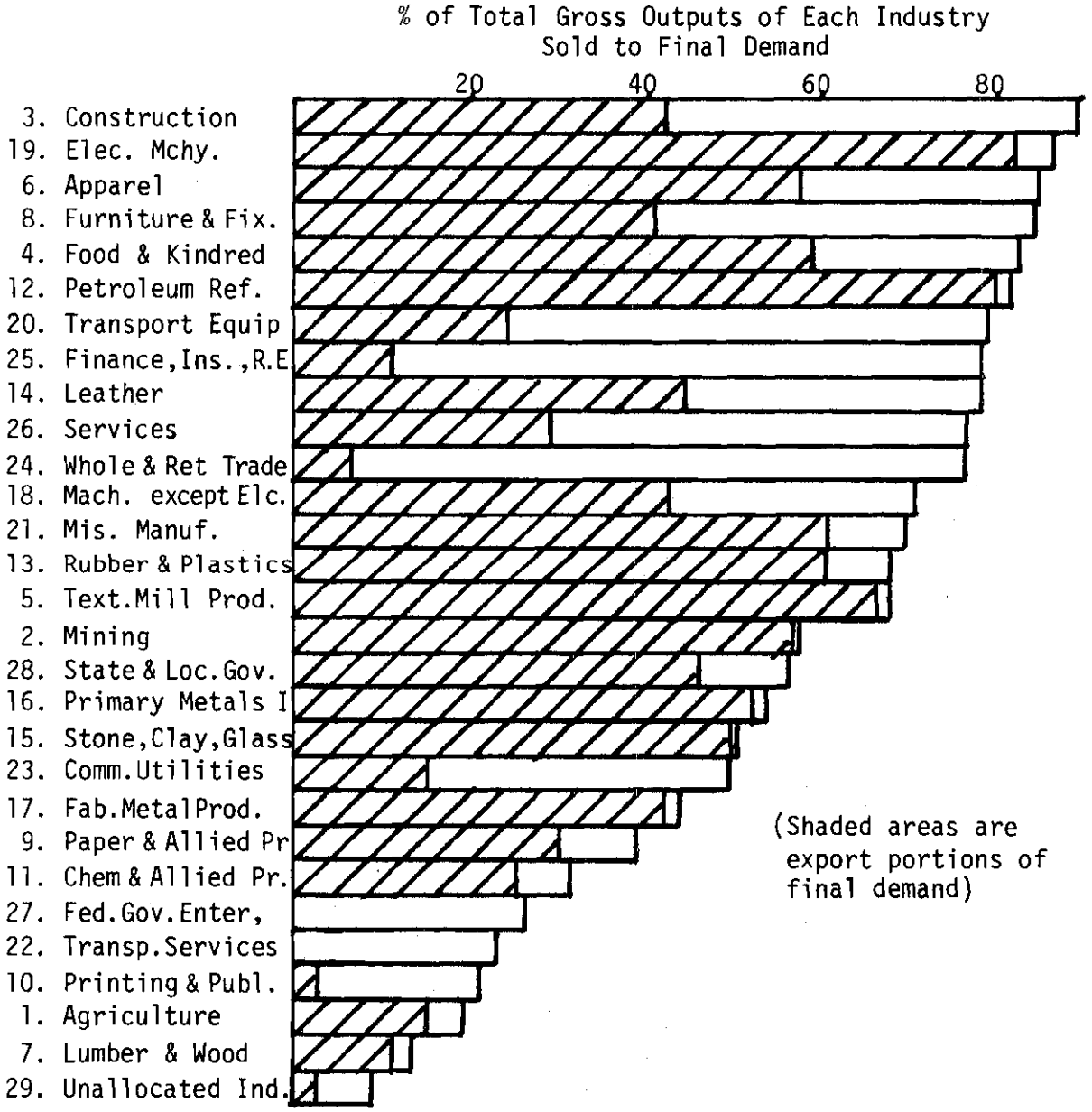


Figure 14. Producing Area Industries Ranked by Percent of Output Sold Directly to Final Demand Sectors, 1972.

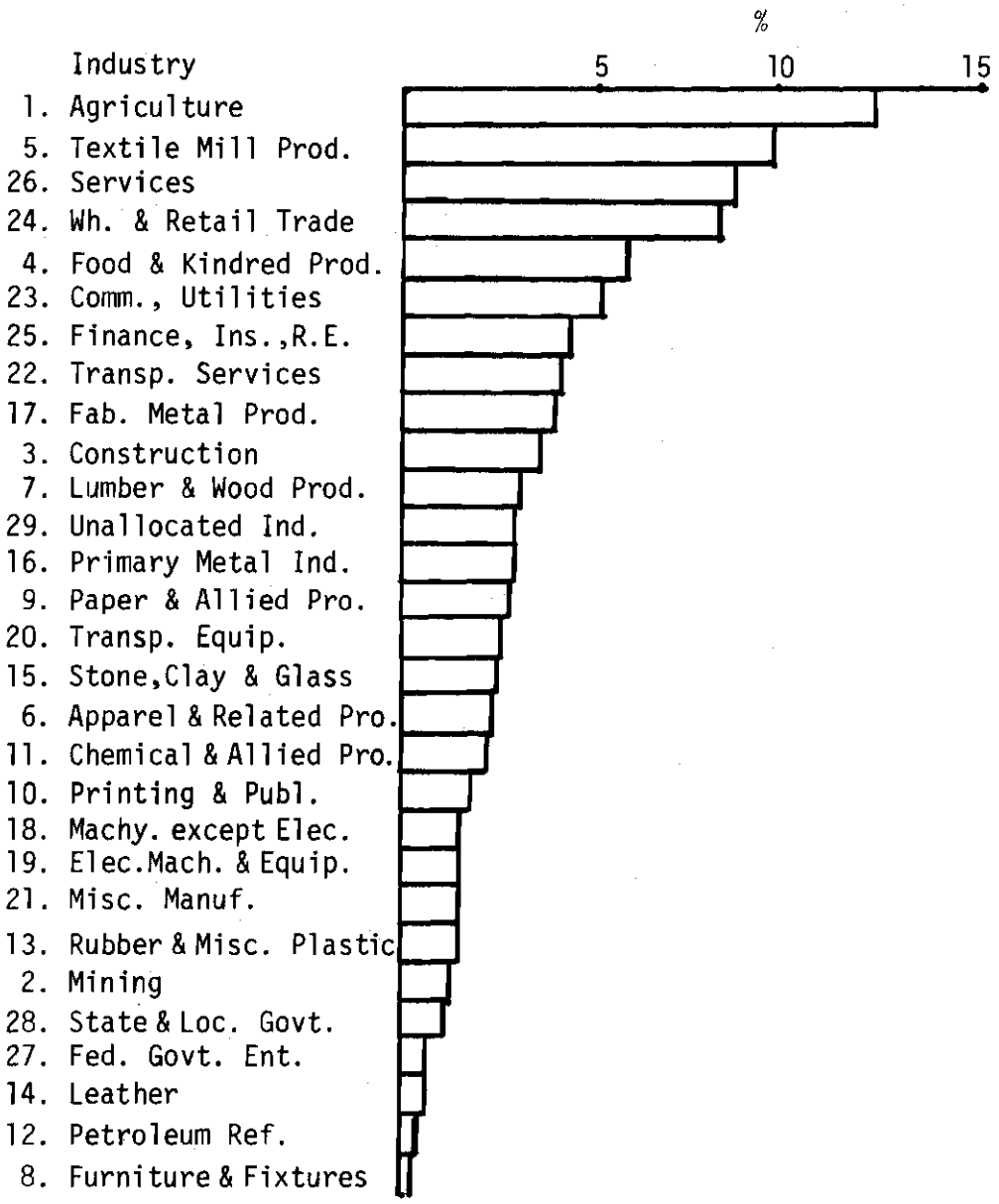


Figure 15. Local Sales in Industry i as a Percent of Total Local Sales in the Area, 1972.

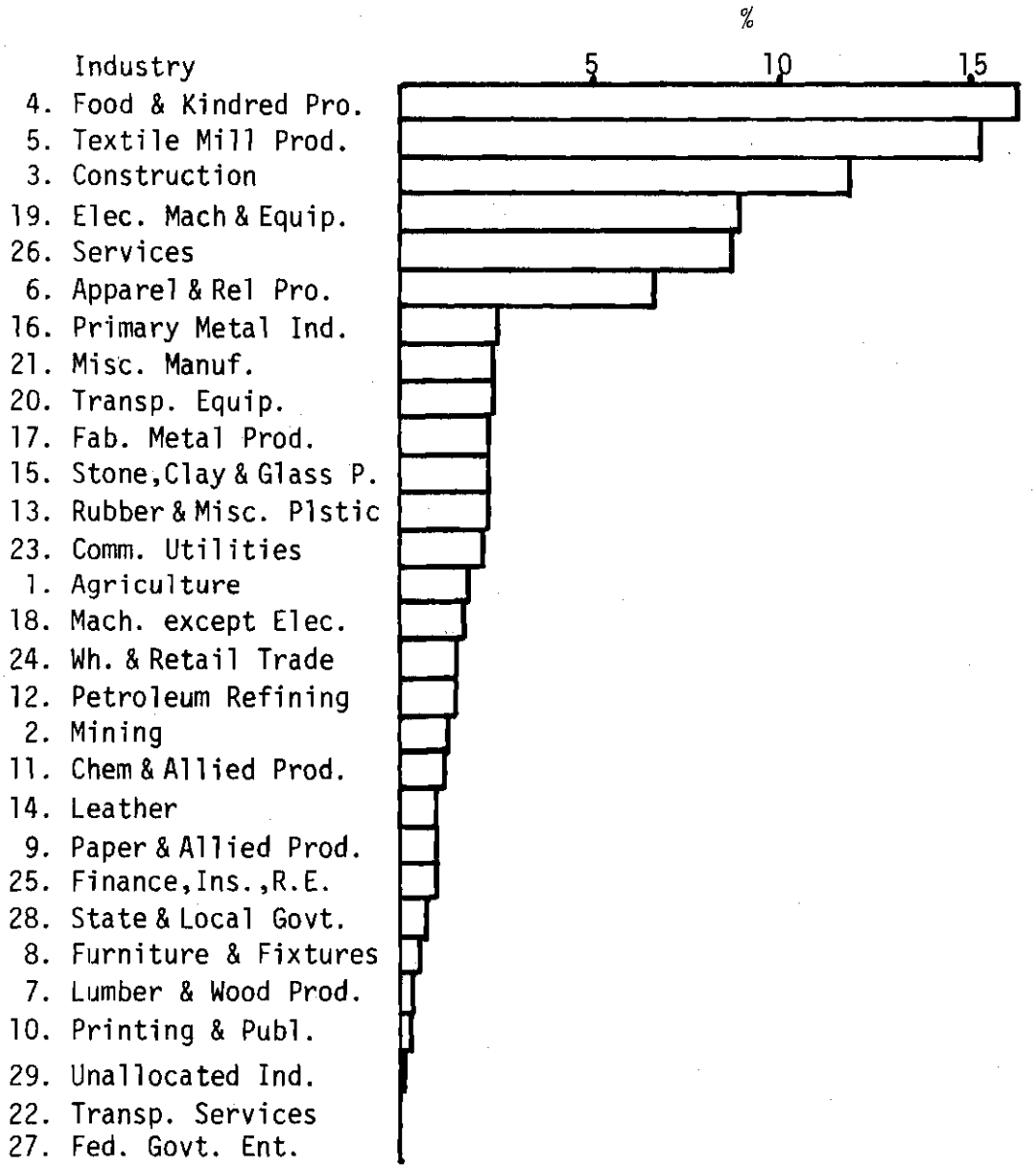


Figure 16. Exports in Industry i as a Percent of Total Exports from the Area, 1972.

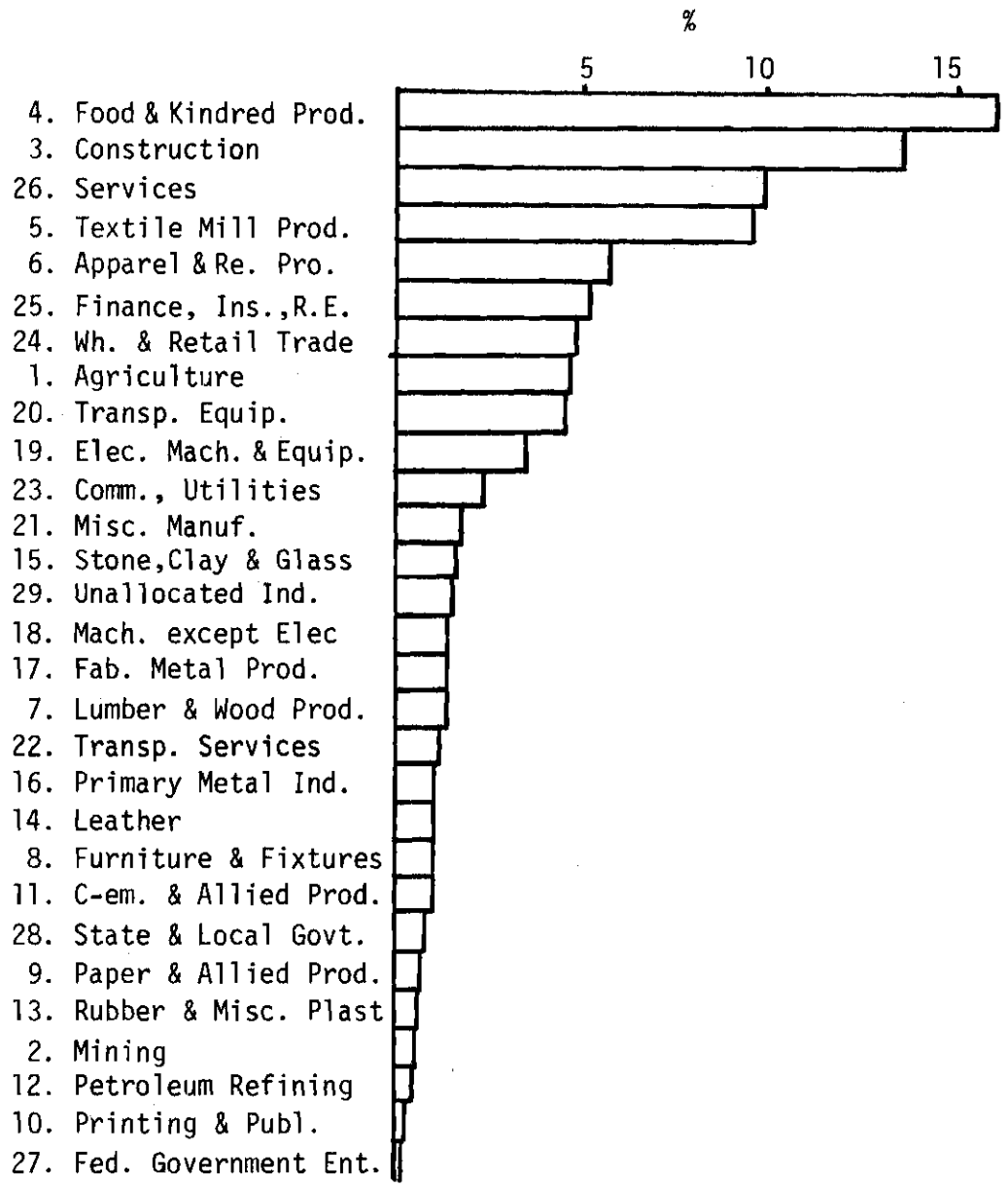


Figure 17. Local Purchases in Industry J as a Percent of Total Local Purchases in the Area, 1972.

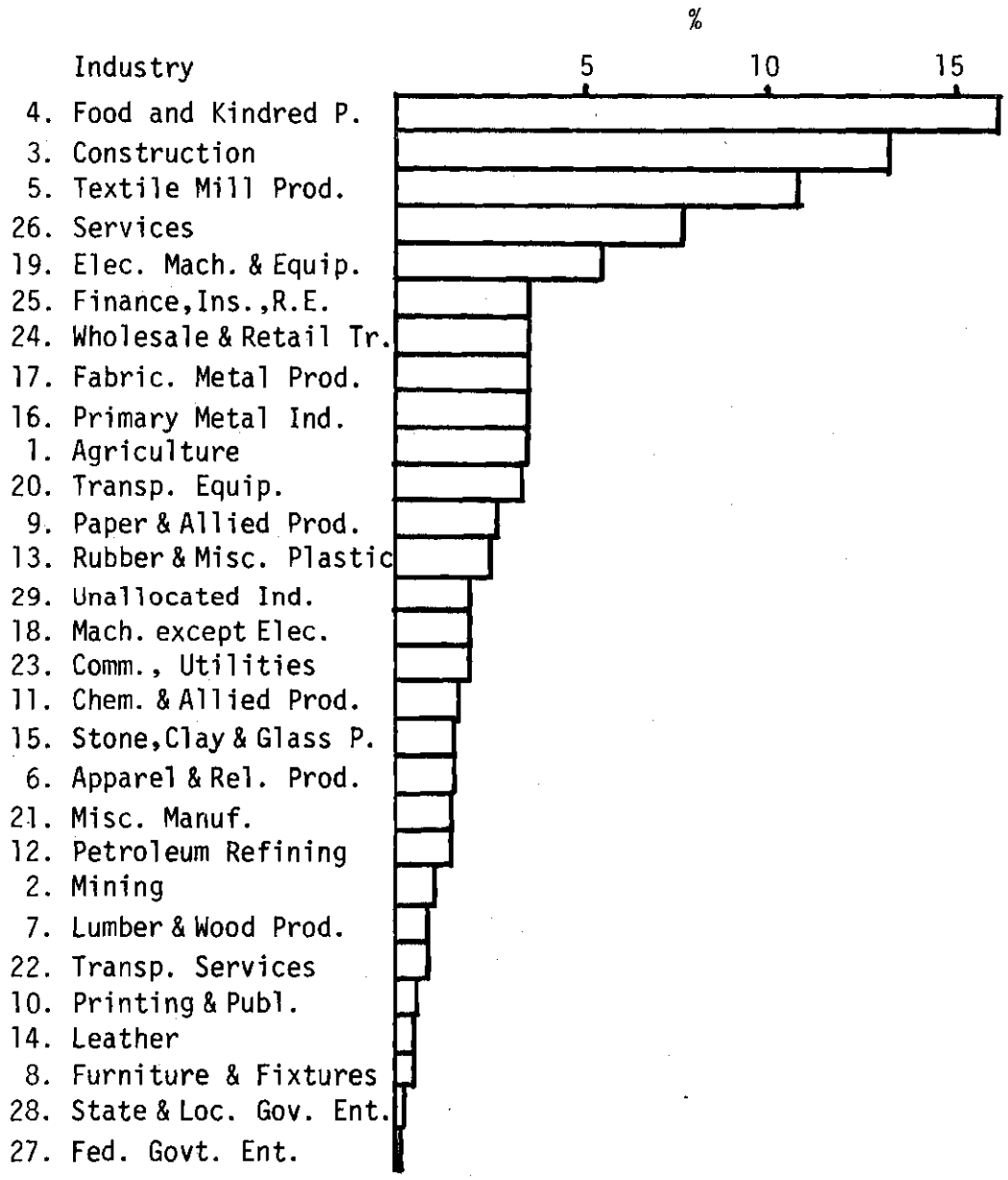


Figure 18. Imports by Industry J as a Percent of Total Imports into the Region.

Ranking industries in this fashion produces an interesting set of data and seems to be an efficient way of comparing relative importance of industries in the area with respect to exports, imports, sales, and purchases.

4.5 Commuting Patterns

The area, in 1970, had a total of 20,364 net out-commuters. This net is computed as the number of employees living in the area and working outside the area (27,905) less the number of employees living outside the area and working in the area (7,541). Income brought into the region by the net out-commuters is known as "commuting income" and is the "residence adjustment" made when converting earnings from "earnings by place of work" to "earnings by place of residence." Table 7 shows the commuting patterns between area counties and the rest of the world. Commuting income was calculated to be $212,798,000 in 1972 for the area given the following two simplifying assumptions:

1) Commuting patterns in the region would remain the same between 1970 and 1972, i.e., the ratio of net commuters to total employment in the area stays constant;

2) Wages paid per employee, on the average, are the same both in and out of the area in 1972.

4.6 Analyzing Regional Growth using Shift-Share Method

As explained before in Chapter II, the shift-share method divides growth in the region into three parts:

1) National Growth;
2) Industrial Mix;
3) Regional Share.

Table 7. Commuting Patterns of Employment for the Northeast Ga. Area, 1970

County of Work / County of Residence	Banks	Barrow	Clarke	Elbert	Franklin	Greene	Gwinnett	Hall	Hart	Jackson	Madison	Morgan	Newton	Oconee	Oglethorpe	Rockdale	Walton	Sub Total	Rest of Ga.	Grand Total	S. Carolina
Banks	879	20	115					358		369								1741	694	2435	15
Barrow	8	4766	487				263	93		75		7		19			146	5864	529	6393	
Clarke	6	118	22341	31	31	14	18	32		101	104			158	41		69	23067	312	23379	
Elbert			118	5046	87				124		129				23			5527	83	5610	237
Franklin	89	21	213	613	3129			26	257	44	34			10				3866	679	4545	104
Greene			185			3116						44		35				3380	164	3544	
Gwinnett		93	7				9400	353		41						55	93	10042	16834	26876	
Hall	32	26	32		6		415	20313		197								21021	1452	2253	
Hart			96	184	653				4217		6			5				5161	73	4134	400
Jackson	45	263	1539		6		49	553		5340	36			6			23	7860	182	8042	
Madison		6	2561	83	119			16	50	191	1781			17	53			4877	-	4877	
Morgan			88			9						2408	205	10		4	253	2977	325	3302	
Newton							16					8	6277			727	162	7140	1998	9138	
Oconee		171	1590			4	8			27		11		797			21	2629	47	2676	
Oglethorpe			1378	87		34					25			47	1087			2658	23	7681	
Rockdale							50					4	165	7		2834	13	3073	3080	6159	
Walton		130	200				181			11		36	341	16		133	5841	6939	2394	8333	
Sub Total	1059	5664	30950	5474	4031	3177	10400	21744	4648	6396	2118	2518	6938	1127	1204	3753	6621	117822	27905	145727	
Rest of Ga.	251	440	217	108	106	216	3503	1714	36	6	-	56	247	-	5	568	68	7541	20364		
Grand Total	1310	6140	31167	5582	4137	3393	13903	23458	4684	6402	2118	2574	7185	1127	1208	4321	6689	125363	--	20364	

Although not a very sophisticated statistical technique, the method attempts to describe growth in the area's industries relative to the growth in a larger region, such as a state or nation.

In Table 8, a shift-share analysis based on industrial earnings in the area for the 1950-1959 and 1959-1970 periods is shown. The Table can be interpreted as in the following example:

The Manufacturing industry, during the 1959-1970 period increased in earnings by $143,263 as shown. This increase can be divided in the following manner:

1) National Growth: Earnings in the manufacturing industry grew at the national all-industry growth rate during the period (58.06%) increasing earnings by $81,885.

2) Industrial-Mix: Manufacturing industry earnings in the nation grew at a slower rate than the all-industry national growth rate, hence, a decline of $17,394 will occur in the area.

3) Regional Share: The area's manufacturing industry earnings grew at a faster rate than the national manufacturing industry's earnings, hence, an increase of $78,802 will occur in the area due to its relative favorable position.

Net relative change for an industry is defined as the sum of the industrial-mix and regional share components; a positive value indicates the amount by which a region's earnings growth exceeded the national growth rate for all industry, a negative value shows the amount of earnings that would have been available in the area if earnings would have grown at the national all-industry growth rate.

Table 8. Shift Share Analysis of the Northeast Ga. Area, 1950-1959, 1959-1970

For 1959-1959

	1950	1959	Nat.Gro.	Ind.Mix	Reg.Sha.	Tot. Cha.	Rel. Change
Agric.	48399	42516	18470.966	-31722.734	7368.7682	-5883.0006	-24353.96
Minin.	2698	1465	1029.6631	-1019.2075	-1243.4556	-1233.	-2262.66
Const.	1378	28195	5258.991	552.75429	8603.2546	14415.999	9056.01
Manuf.	93964	140993	35860.365	5078.2542	6090.3802	47028.998	11168.63
Trcopu	15579	28184	5945.5603	-1249.3978	7908.8372	12605.999	6659.44
Trade	55147	78318	21046.268	-4396.5582	6521.2896	23171.999	2124.73
Fiinre	8050	17287	3072.1972	2268.718	3896.0846	9236.9997	6164.80
Servi.	30303	51131	11564.819	5742.6182	3520.5624	20827.999	9263.18
T Govt.	30798	56740	11753.73	10207.583	3980.6866	25942.999	1418.27
FE Gov.	8645	14654	3299.2726	1298.2737	1411.4535	6008.9998	2709.73
St.&Loc.	19005	34983	7253.0569	8407.2222	317.72078	15978.999	8724.94
Milit.	3146	7101	1200.6376	1095.4808	1658.8816	3954.9999	2754.36

For 1959-1970

	1959	1970	Nat.Gro.	Ind.Mix	Reg.Sha.	Tot.Cha	Rel. Change
Agric.	42516	41432	24683.168	-18200.967	-7566.2015	-1084.0001	-25767.17
Minin.	1465	2914	850.52312	-708.7708	1307.2477	1449.9999	598.48
Const.	28195	43691	16368.942	-105.21522	-767.72658	15496.999	-872.94
Manuf.	140993	284256	81855.158	-17394.333	78802.172	143263.99	61407.84
Trcopu	28184	53589	16362.555	-3467.1862	12509.63	25405.999	9042.44
Trade	78318	141682	45468.444	-8984.6936	26880.248	63363.999	17895.55
Fiinre	17287	20653	10036.173	245.21191	-6915.3848	3365.9999	06670.17
Servi.	51131	99714	29684.708	15329.956	3568.3345	48582.999	18898.29
TGovt.	56740	147065	32941.08	22520.426	34863.492	90324.998	57383.92
FeGov.	14654	35095	8507.5535	2843.3781	9090.0682	20441.999	11933.44
St.&Loc	34983	100494	20309.795	23423.547	21777.657	65510.999	45201.20
Milit.	7101	11472	4122.5698	-251.83423	500.26445	4371	248.43

Table 9 shows the possible outcomes and their interpretations. For example, the area's manufacturing industry during the 1959-1970 period had a positive relative change with a negative industrial-mix and positive regional share component, hence, the appropriate interpretation is that the area's earnings growth in that industry was greater than that of the nation because its unfavorable industrial-mix was more than offset by an increasing relative share of total earnings for all industries combined.

Although this shift-share analysis shows only broad industry sectors, it is possible to conclude that, in terms of earning power, the area has concentrated in slow-growth manufacturing industries (shown by a negative industrial-mix component), agriculture earnings are decreasing, i.e., the area seems to be moving towards more manufacturing industrialization, and, finally, given that there are positive relative changes in 9 out of 12 broad industry sectors, the area is growing at a faster rate than the U.S. as a whole. This last fact can be verified by comparing growth rates between the Area and the U.S. in Figure 9.

Table 9. Significance of Elements of Change in Shift-Share Analysis

Element of Change	Significance
For Individual Industry	
Industrial Mix Positive	Nationally, the industry grew more rapidly than did the average rate for all industries combined.
Industrial Mix Negative	Nationally, the industry grew less rapidly than did the average rate of all industries combined.
Regional Share Negative	The region's relative share of employment in the industry declined, i.e., the industry grew less rapidly (or declined more rapidly) in the region than in the nation as a whole.
Industrial Mix Positive-- Regional Share Negative	The region's relative share of employment declined in an industry that grew more rapidly nationally than did the average rate for all-industry.
Industrial Mix Negative Regional Share Positive	The region gained a larger relative share of employment in an industry that is growing less rapidly than the average rate for all industry (or is even declining).
Industrial Mix Negative Regional Share Negative	The region's relative share of employment is declining in an industry that nationally is growing less rapidly than the average rate for all industry.
For Industrial Total:	
Relative Change Positive	Employment in the region grew more rapidly than it did in the nation as a whole.
Relative Change Negative	Employment in the region grew less rapidly than it did in the nation as a whole.

(Continued)

Table 9. Significance of Elements of Change in Shift-Share Analysis (Continued)

Element of Change	Significance
Relative Change Positive-- Industrial Mix Positive Regional Share Positive	The region's rate of employment growth was greater than that of the nation because (1) the region had concentrated in industries that nationally were growing at a more rapid rate than that for all-industry combined, i.e., its industrial mix was favorable, and (2) the region also gained a larger relative share of employment in these industries.
Relative Change Positive-- Industrial Mix Positive Regional Share Negative	The region's rate of employment growth was greater than that of the nation because its favorable industrial mix was able to offset a declining relative share of total employment in its industries.
Relative Change Positive-- Industrial Mix Negative Regional Share Positive	The region's employment growth was greater than that of the nation because its unfavorable industrial mix was more than offset by an increasing relative share of total employment in its industries.
For Industry Total:	
Relative Change Negative-- Industrial Mix Negative Regional Share Positive	The region's rate of employment growth was less than that of the nation because its industrial mix was too unfavorable to be offset by an increasing relative share of total employment in its industries.
Relative Change Negative-- Industrial Mix Positive	The region's rate of employment growth was less than that of the nation because its industrial mix was favorable but was more than offset by a declining relative share of total employment in its industries.
Relative Share Negative-- Industrial Mix Negative Regional Share Negative	The region's rate of employment was less than that of the nation because its industrial mix was unfavorable and its share of total employment in its industries was declining.

Source: (21)

CHAPTER V

THE INPUT-OUTPUT MODEL FOR THE NORTHEAST GEORGIA AREA: 1974

5.1 The Aggregated I-O Model

For illustration purposes, the Northeast Georgia I-O model has been aggregated to the five-industry detail. A 29-industry model is presented in Appendix B. In this section, four tables will be presented: the "transactions" table, the "direct requirements" table, the "direct and indirect requirements" table, and the "direct, indirect, and induced requirements" table.

5.1.1 The Transactions Table

Table 10 shows the interindustry transactions, sales to final demand, and payments to the final payment sectors. All figures are in dollar terms and the industries listed on the left side of the table are selling to industries listed across the top of the table. The area's income and product account are shown in quadrants I and III and non-market transfers are given in quadrant IV.

5.1.2 The Direct Requirements Table

Table 11 shows the direct purchases required from industry i by industry j for each dollar's worth of goods and services purchased by industry j. This table was obtained by dividing the column elements by the column totals. The numbers in the interindustry matrix (quadrant II)

Table 10. Aggregated Interindustry Transactions for the Northeast Ga. Area, 1972

	1	2	3	4	5	Total Sales	HHD	Other	Exports	Total FD	Total Outputs
1) Agriculture & Mining	10.695	3.753	104.192	0.262	4.586	123.488	6.102	0.205	37.328	43.635	167.123
2) Contract Construction	1.053	0.129	3.043	1.121	27.409	37.755	0	164.905	141.558	306.463	339.218
3) Manufacturing	27.834	75.087	294.789	12.135	33.17	443.015	212.222	40.685	816.308	1069.215	1512.23
4) Trade	4.03	24.558	29.0	2.734	14.035	74.357	226.717	1.351	18.081	246.149	320.506
5) Services	6.459	22.667	73.899	28.858	119.589	251.472	327.819	19.334	151.749	498.902	750.374
6) Total Local Purchase	50.071	126.194	504.923	45.11	198.789	925.087	772.86	226.48	1165.024	2164.364	3089.451
7) Households	57.115	89.458	417.331	160.056	257.14	981.1	9.568	319.401	212.798	541.767	1522.867
8) Other Final Payments	27.914	32.696	161.93	90.226	179.934	492.7	363.683	60.483	0	424.166	916.866
9) Imports	32.019	90.872	428.04	25.112	114.509	690.552	376.685	69.467	-1136.704	-690.552	0
0) Total Final Payments	17.048	213.026	1007.301	275.394	551.583	2164.352	749.936	449.351	-923.906	275.381	2439.733
1) Total Inputs	167.119	339.22	1512.224	320.504	750.372	3089.439	1522.796	675.831	241.118	2439.745	5529.184

(millions of dollars)

Table 11. Aggregated Direct Requirements Table for the Northeast Ga. Area, 1972

	1	2	3	4	5	6
1) Agriculture & Mining	.06	.01	.07	.0008	.01	.004
2) Contract Construction	.01	.0004	.002	.0035	.04	0
3) Manufacturing	.17	.22	.19	.04	.04	.14
4) Trade	.02	.07	.02	.008	.02	.15
5) Services	.04	.07	.05	.09	.16	.216
6) Total Local Purchases	.3	.37	.33	.14	.26	.51
7) Households	.34	.26	.28	.5	.34	.006
8) Other Final Payments	.17	.10	.11	.28	.24	.24
9) Imports	.19	.22	.28	.08	.15	.25
10) Total Final Payments	.7	.63	.67	.86	.73	.49
11) Total Inputs	1	1	1	1	1	1

are known as the production or input coefficients and referred to as the A matrix. Finally, the figures represent the proportion of its total inputs that each buying industry j obtains from each selling industry i, with no regard for indirect effects. For example, for each dollar of goods manufacturing sells to final demand, $.07 goes to agriculture, $.002 to construction, and so on.

5.1.3 The Direct and Indirect Requirements Table

Table 12 is the total requirements table, and the numbers shown represent the total (direct and indirect) dollar value of goods required by the j^{th} industry from the i^{th} industry for every dollar of goods sold to the final demand sector by the j^{th} industry. The figures in the interindustry section (quadrant II) form the $(I-A)^{-1}$ matrix. The inverse is a representation of the I-O multiplier, i.e., it sums the initial effect of the $1 increase in sales to the final demand sectors by industry j and successive rounds of expenditure which the initial effect generates in the industries supplying inputs to industry j. Recall from Chapter I that,

$$\text{Total Effect} = I + A + A^2 + A^3 + \ldots = (I - A)^{-1}$$

5.1.4 The Direct, Indirect, and Induced Requirements Table

An I-O model is said to be closed with respect to households when the household sector becomes (or is assumed) endogenous. The result of this closure is to include the household row and column in the interindustry matrix where it becomes subject to the assumption that expenditures are proportional to income. Hence, Table 13 is an "extended"

Table 12. Aggregated Direct and Indirect Requirements Table for the Northeast Ga. Area, 1974

	1	2	3	4	5
1) Agriculture & Mining	1.082315	0.03353	0.09495	0.00656	0.01916
2) Contract Construction	0.014197	1.006045	0.006915	0.00825	0.04860
3) Manufacturing	0.23589	0.289714	1.26195	0.059184	0.0781
4) Trade	0.028987	0.07975	0.029256	1.01225	0.02965
5) Services	0.06987	0.11122	0.083378	0.112978	1.203265
6) Total Local Purchases	1.431258	1.5202615	1.476731	1.1992192	1.3787817

Table 13. Aggregated Direct, Indirect and Induced Requirements Table for the Northeast Ga. Area, 1972

	1	2	3	4	5	6
1) Agriculture & Mining	1.096817	0.0467	0.10808	0.023787	0.0333254	0.03047
2) Contract Construction	0.022332	1.013425	0.142735	0.01796438	0.05654853	0.1709181
3) Manufacturing	0.36554646	0.40733218	1.3792315	0.21322189	0.20476025	0.27240047
4) Trade	0.13258413	0.17372	0.123234	1.135328	0.130848	0.21765144
5) Services	0.253997	0.27825	0.24993019	0.3317312	1.3831293	0.38684285
6) Households	0.6375534	0.57836	0.576696	0.7574448	0.62279084	1.339464
7) Total Local Purchases	2.5088	2.4978	2.45144	2.4794276	2.4314024	2.2639179

direct and indirect requirements table. Effects of increases in sales to final demand are now to be traced through the households "industry" and hence, the multipliers will be larger than those reported in the direct and indirect requirements table.

5.2 Input-Output Multipliers

In general, I-O multipliers represent the total effect (direct, indirect, and/or induced) a change in sales to final demand will have on the economic system. In this section, we will be concerned with multipliers that trace out output, employment, income, and government income effects due to a change in the level of sales to final demand.

5.2.1 Output Multipliers

The output multipliers for an industry j measures the sum of the requirements from a-l supplying industries needed in order to deliver $1 of output from industry j to final demand. Usually, the output multipliers are of two varieties:

1) Direct and indirect requirements (or simple) multipliers: The value of the multiplier for industry j is found by adding the entries down the j^{th} column (or reading the entry in the "total local purchases" row at the j^{th} column) in the direct and indirect requirements table, Table 12. We have,

$$SOM_j = \sum_{i=1}^{n} b_{ij}, \quad j=1,2,3,\ldots,n \ , \tag{5.1}$$

where, SOM_j = simple output multiplier for the j^{th} industry.

b_{ij} = an entry in the i^{th} row and j^{th} column of the direct and indirect requirements table.

Table 14. Output Multipliers for the Northeast Ga. Area, 1972

	Industry	Output Multipliers Simple	Total
1.	Agriculture	1.47	2.57
2.	Mining	1.31	2.16
3.	Contract Construction	1.49	2.46
4.	Food and Kindred Products	1.65	2.46
5.	Textile Mill Products	1.45	2.43
6.	Apparel and Related Products	1.56	3.04
7.	Lumber and Wood Products	1.58	2.60
8.	Furniture and Fixtures	1.67	2.75
9.	Paper and Allied Products	1.26	1.95
10.	Printing and Publishing	1.20	2.39
11.	Chemicals and Allied Products	1.34	2.21
12.	Petroleum Refining	1.29	2.11
13.	Rubber and Misc. Plastics	1.21	2.03
14.	Leather and Leather Products	1.57	2.73
15.	Stone, Clay and Glass Prod.	1.41	2.54
16.	Primary Metal Industries	1.24	2.01
17.	Fabricated Metal Products	1.27	2.10
18.	Machinery, Except Electrical	1.39	2.32
19.	Electrical Machinery & Equip.	1.33	2.31
20.	Transportation Equipment	1.49	2.27
21.	Miscellaneous Manufacturing	1.53	2.56
22.	Transportation Services	1.32	2.75
23.	Communications & Utilities	1.27	2.13
24.	Wholesale and Retail Trade	1.19	2.46
25.	Finance, Ins., Real Estate	1.38	2.43
26.	Services	1.34	2.42
27.	Federal Government Enterprises	1.21	3.07
28.	State & Local Government Enterprises	1.53	2.22
29.	Unallocated Industries	1.70	2.25
30.	Households	.00	2.26

n = number of industries

The simple multipliers for the Northeast Georgia can be found in Table 14.

2) Direct, Indirect, and Induc-d requirements (total) multipliers: The value of this multiplier includes the induced effect of household expenditures and can be found, for the j^{th} industry, by summing the entries in the j^{th} column of the total requirements table, Table 13. It can also be found in the "total local purchases" row at the j^{th} column. In equation form, we have,

$$TOM_j = \sum_{i=1}^{n+1} b'_{ij}, \quad j=1,2,3,\ldots,n+1 \qquad (5.2)$$

where, TOM_j = Total output multiplier for the j^{th} industry

b'_{ij} = An entry in the total requirements table.

n+1 = number of industries plus the household "industry."

The total multipliers for the region are found in Table 14.

The actual use of the output multiplier is to indicate the degree of structural interdependence between each industry and the rest of the regional economy.

A high output multiplier represents an industry which is highly interdependent with other industries in the area. Apparel and federal government enterprises stand out as having the highest extended or total multipliers because of large inputs from the households industry.

5.2.2 Income Multipliers

The household-income multiplier for industry j measures the income

Table 15. Income Multipliers for the Northeast Ga. Area, 1972

	Industry	Income Created per Dollar of Final Sales			
		Direct	Indirect	Induced	Total
1.	Agriculture	.35	.13	.16	.65
2.	Mining	.28	.10	.13	.51
3.	Contract Construction	.26	.17	.15	.58
4.	Food and Kindred Products	.16	.20	.12	.48
5.	Textile Mill Products	.30	.14	.15	.58
6.	Apparel and Related Products	.46	.19	.22	.88
7.	Lumber and Wood Products	.28	.18	.15	.61
8.	Furniture and Fixtures	.27	.21	.16	.64
9.	Paper and Allied Products	.22	.08	.10	.41
10.	Printing and Publishing	.46	.07	.18	.70
11.	Chemicals and Allied Products	.28	.11	.13	.52
12.	Petroleum Refining	.26	.10	.12	.48
13.	Rubber and Misc. Plastics	.29	.07	.12	.49
14.	Leather and Leather Products	.34	.17	.17	.69
15.	Stone, Clay and Glass Prod.	.36	.14	.17	.67
16.	Primary Metal Industries	.26	.07	.11	.45
17.	Fabricated Metal Products	.28	.08	.12	.49
18.	Machinery, except Electrical	.30	.12	.14	.55
19.	Electrical Machinery & Equip.	.33	.10	.15	.58
20.	Transportation Equipment	.21	.13	.12	.46
21.	Miscellaneous Manufacturing	.29	.17	.15	.61
22.	Transportation Services	.53	.11	.21	.85
23.	Communications & Utilities	.29	.08	.13	.51
24.	Wholesale and Retail Trade	.50	.06	.19	.75
25.	Finance, Ins., Real Estate	.34	.12	.16	.62
26.	Services	.36	.11	.16	.64
27.	Federal Government Enterprises	.74	.08	.28	1.10
28.	State & Local Government Enterprises	.15	.16	.10	.41
29.	Unallocated Industries	.00	.24	.08	.32
30.	Households	.01	-.01	1.34	1.34

generated as a result of $1 increase in sales to final demand from the j^{th} industry. As before, the income multipliers are of two types, simple if determined from the direct and indirect requirements table, and total, if determined from the direct, indirect, and induced table.

1) Simple Income Multiplier (SIM_j): For industry j, the multiplier is defined as:

$$SIM_j = \sum_{i=1}^{n} b_{ij} b_{hhd,j}, \quad j=1,2,3,\ldots,n \tag{5.3}$$

where, $b_{hhd,j}$ = the entry in the household row and j^{th} column in the direct requirements table.

2) Total Income Multiplier (TIM_j): For industry, j, the multiplier can be expressed as:

$$TIM_j = b'_{hhd,j}, \quad j=1,2,3,\ldots,n \tag{5.4}$$

where, $b'_{hhd,j}$ = the entry in the household row and j^{th} column of the direct, indirect, and induced requirements table.

Total income multipliers can be found in Table 15.

The total income multiplier consists of three components:

a) The direct income generated through the payment of wages and salaries, proprietor's income, etc., by industry j when producing for an additional dollar of final demand sales. This component of the TIM_j, im_j, is found in the household row and j^{th} column of the direct requirements table, Table 11. We have

$$im_j = a_{hhd,j}, \quad j=1,2,3,\ldots,n\ , \tag{5.5}$$

where im_j = the direct income component of the TIM_j.

b) The indirect income generated through the payments to households that are a consequence of the purchase of goods and services by industry j from other industries in order to produce the additional output for delivery to final demand. The indirect income component of the TIM_j, im'_j, is obtained by subtracting the direct income component, im_j, from the SIM_j. That is

$$im'_j = SIM_j - im_j, \quad j=1,2,3,\ldots,n \tag{5.6}$$

where im'_j = indirect income component of the TIM_j

c) The induced income generated through the spending of additional income households receive from additional sales to final demand by industry j. This component of the TIM_j, im'_j, is obtained by subtracting the SIM_j from the TIM_j:

$$im'_j = TIM_j - SIM_j, \quad j=1,2,3,\ldots,n \tag{5.7}$$

See Table 15 for the regional component income multipliers.

The use of the income multipliers is to determine the total income effects that a change in the sales to final demand by each industry j would have on the region.

From Table 15, we observe that apparel, printing and publishing, leather, transportation services, and wholesale and retail trade are industries which generate the most income per dollar of sales to final demand by selling industry.

5.2.3 Employment Multipliers

Employment multipliers represent the change in employment that is

Table 16. Employment Multipliers for the Northeast Ga. Area, 1972

	Industry	Simple	Total
1.	Agriculture	.2257	.4246
2.	Mining	.3577	.5126
3.	Contract Construction	.4285	.6052
4.	Food and Kindred Products	.3259	.4734
5.	Textile Mill Products	.5418	.7197
6.	Apparel and Related Products	1.0951	1.3643
7.	Lumber and Wood Products	.6335	.8191
8.	Furniture and Fixtures	.6092	.8050
9.	Paper and Allied Products	.3035	.4284
10.	Printing and Publishing	.5063	.7217
11.	Chemicals and Allied Products	.3580	.5160
12.	Petroleum Refining	.3424	.4902
13.	Rubber and Misc. Plastics	.3972	.5459
14.	Leather and Leather Products	.7051	.9156
15.	Stone, Clay and Glass Prod.	.5548	.7591
16.	Primary Metal Industries	.3294	.4674
17.	Fabricated Metal Products	.3549	.5059
18.	Machinery, except Electrical	.3972	.5666
19.	Electrical Machinery & Equip.	.4267	.6042
20.	Transportation Equipment	.2881	.4290
21.	Miscellaneous Manufacturing	.5557	.7428
22.	Transportation Services	.4339	.6938
23.	Communications & Utilities	.3203	.4757
24.	Wholesale and Retail Trade	.6677	.8974
25.	Finance, Ins., Real Estate	.3202	.5109
26.	Services	.3396	.5346
27.	Federal Government Enterprises	.2726	.6087
28.	State & Local Government Enterprises	1.6700	1.7946
29.	Unallocated Industries	.4563	.5556
30.	Households	-0-	.4099

generated through a change in the output sold to final demand by industry j. Therefore, it is easy to understand why labor-intensive industries such as apparel, have high employment multipliers.

Provided that there exist estimates of employment-to-output ratios for each industry (i.e., reciprocals of the productivity ratios), it is possible to convert the output multipliers into employment multipliers. These multipliers also come in two varieties, simple and total:

1) Simple Employment Multipliers (SIM_j): These are defined for each industry j as:

$$SEM_j = \sum_{i=1}^{n} b_{ij}(E/O)_i, \quad j=1,2,3,\ldots,n \tag{5.8}$$

where $(E/O)_i$ = Employment-to-output ratio for industry i.

2) Total Employment Multipliers (TEM_j): These are defined for each industry j as

$$TEM_j = \sum_{i=1}^{n} b'_{ij}(E/O)_i, \quad j=1,2,3,\ldots,n \tag{5.9}$$

A high employment multiplier would represent a labor-intensive type of industry; textile mill, apparel, lumber and wood, furniture and fixtures, leather and trade industries, which are labor-intensive, have the highest multipliers, as seen in Table 16.

5.2.4 Government-Income Multipliers

Government-income multipliers provide an estimate of the amount by which income to local and State governments is expected to increase for for each dollar of sales to final demand by industry i in the Area.

Table 17. Government-Income Multipliers for the Northeast Ga. Area, 1972

	Industry	City & County Govt. Mult Simp	City & County Govt. Mult Total	State Govt. Mult Simp	State Govt. Mult Total
1.	Agriculture	.02	.03	.01	.03
2.	Mining	.01	.02	.01	.03
3.	Contract Construction	.02	.03	.02	.04
4.	Food and Kindred Products	.01	.02	.01	.03
5.	Textile Mill Products	.01	.02	.01	.04
6.	Apparel and Related Products	.00	.02	.01	.05
7.	Lumber and Wood Products	.02	.03	.03	.06
8.	Furniture and Fixtures	.01	.02	.01	.04
9.	Paper and Allied Products	.01	.02	.01	.03
10.	Printing and Publishing	.01	.02	.01	.04
11.	Chemicals and Allied Products	.01	.02	.01	.03
12.	Petroleum Refining	.01	.02	.01	.03
13.	Rubber and Misc. Plastics	.01	.02	.01	.03
14.	Leather and Leather Products	.01	.02	.01	.04
15.	Stone, Clay and Glass Prod.	.01	.03	.01	.04
16.	Primary Metal Industries	.01	.02	.01	.03
17.	Fabricated Metal Products	.01	.02	.01	.03
18.	Machinery, except Electrical	.01	.02	.01	.03
19.	Electrical Machinery & Equip	.01	.02	.01	.03
20.	Transportation Equipment	.01	.02	.01	.03
21.	Miscellaneous Manufacturing	.01	.02	.01	.04
22.	Transportation Services	.01	.03	.01	.05
23.	Communications & Utilities	.04	.05	.01	.03
24.	Wholesale and Retail Trade	.01	.03	.13	.16
25.	Finance, Ins., Real Estate	.02	.03	.02	.05
26.	Services	.03	.04	.02	.04
27.	Federal Government Enterprises	.00	.02	.00	.05
28.	State & Local Government Enterprises	.01	.02	.01	.02
29.	Unallocated Industries	.01	.01	.01	.03
30.	Households	.00	.03	.00	.06

$$SGIM_i = b_{ij}(LG_i/O_i) \text{ or } = b_{ij}\ (SG_i/O_i) \qquad (5.10)$$

where $SGIM_i$ = Simple government income multiplier for i

LG_i = entry in the local government final payments row

SG_i = entry in the State government final payments row

O_i = Total Output in industry i

b_{ij} = entry in the i^{th} row and j^{th} column of the direct and indirect requirements matrix

$$TGIM_i = b'_{ij}(LG_i/O_i) \text{ or } = b'_{ij}(SG_i/O_i) \qquad (5.11)$$

where TGIM = Total government income multipliers for industry i

b'_{ij} = entry in the i^{th} row and j^{th} column of the direct, indirect, and induced requirements matrix.

As can be seen, at the local level, communications and utilities and at the state level, wholesale and retail trade industries have high values for their multipliers. These multipliers are useful for comparing what the effect would be of increasing one industry's output over another.

5.4 Constructing the Model

In order to develop the Northeast Georgia I-O model, the following basic data was required:

1) 1970 Georgia 300-industry detail I-O Model (64);

2) Employment data for the 17-county region and for the state of Georgia (23,64);

3) Personal income estimates for the 17-county region (79).

In addition, agricultural outputs (77), construction industry outputs (78) and commuting patterns (24) were required. For a detailed explanation of

the construction of the model refer to Appendix A.

Briefly the construction procedure is as follows:
A first estimate of gross outputs by industry (300-industry detail) for the region was obtained by calculating ratios of regional to state employment and then multiplying these ratios times the entries in the interindustry transactions table of the I-O model of Georgia. A second estimate of regional outputs was obtained by reconciling first estimates with household earnings found in the personal income estimates.

Once gross outputs are corrected, area transactions are obtained through a ratioing scheme as explained above. Several other corrections are made until the final transactions table is produced. The table is then aggregated to a 29-industry detail and then the other requirement tables are produced. See Appendix B for the regional I-O model produced. The manipulation of the data is done entirely with computer programs developed at Georgia Tech under the supervision and direction of Schaffer (64).

Hence, it is assumed throughout the study that industries within the area have similar product mix as those found in the state.

Product mix similarity assumes that:

1) The products of area industries are similar to the products of corresponding state industries;

2) The products of area industries are produced in the same proportion as products made in the corresponding state industries.
Corrections were made wherever possible to allow for area industries that produced proportionally more (or less) than state industries, e.g., poultry products.

In conclusion, although we have made extensive use of the Georgia I-O model in estimating area transactions, the Northeast Georgia model is not a scaled-down version of the former, but a model with realistic figures.

CHAPTER VI

THE NORTHEAST GEORGIA AREA TO 1980

6.1 Introduction

The main purpose of forecasting is to provide a body of information which recognizes future developments and allows people in positions of social responsibility to plan accordingly, e.g., by expanding government services and infrastructure for increased industrial activity.

Specifically, I-O forecasts provide, among other things:

1) A set of gross outputs required from each industry in order to deliver goods to local industries and final-demand sectors at the end of the forecasting period, and

2) A set of employment requirements estimated with projected employment-to-output ratios. In this chapter, both of these sets of data will be provided.

As was shown in Chapter I, I-O projections consist of projecting final demand separately and then, given this set of exogenous variables, solving for the endogenous set:

$$X_{80} = (I - A)^{-1} \cdot Y_{80} \qquad (6.1)$$

where, X_{80} is a vector of gross outputs in 1980, and Y_{80} is the projected vector of final demand to 1980; $(I - A)^{-1}$ is the inverse matrix of the constant coefficients, known as the Leontief inverse matrix.

Therefore, the general problem of I-O forecasting has two aspects:

1) Will the Leontief matrix change very much through time (enough to cause gross errors)?

2) How to forecast final demand sectors.

6.2 Changes in the Leontief Matrix

In Chapter III, causes of coefficient change were discussed and empirical tests of coefficient stability were mentioned. In the area model we have used relationships of input coefficients which are average for the state of Georgia, hence, it is possible that the area input coefficients may reflect relationships somewhat "advanced" for the region, especially in technology.

Since subjective statements such as the above cannot be verified in reality, a simpler approach to solving the "coefficient change" problem will be made. That is, in order to produce "reliable" gross outputs for 1980, we will aggregate the 300-industry matrix to the 29-industry level, in the hopes that, as Sevaldson (68) found true, variations in the coefficients will be minimum.

6.2 Forecasting Final Demand

Final demand was disaggregated into its components -- household expenditures, investment, government expenditures and exports -- before projections were made. With existing projections for the area and the U.S., the following method was used:

1) Personal consumption was projected using the expected growth of total personal income during the period 1972-1980, i.e., 6.11% annual compound growth rate, for all industries (80). Consumption expenditures in 1980 would remain the same proportion of total household expenditures

as in 1972.

2) Investment in the area was expected to grow at the national investment growth rate projected for the period 1972-1980, 4.8% per year (81).

3) Government expenditures were expected to rise according to their growth in earnings for the period 1972-1980, i.e., 6.39% per year for Federal government and 6.98% per year for state and local governments (80).

4) Exports were expected to increase according to the growth in outputs of national industries during the period 1972-1980.

Industry	Annual Compound Growth Rate (%)
1) Agriculture	3.3
2) Mining	2.9
3) Contract Construction	4.6
4) Manufacturing	4.0
5) Transportation, communications and public utilities	5.2
6) Wholesale & Retail Trade	4.5
7) Finance, Insurance, and Real Estate	5.0
8) Services	4.5
9) Government	2.5

Table 18 shows the results of forecasting final demand sectors with the growth rates given previously. The first column shows 1972 final demands (aggregated) by industry, the second column shows 1980 final demands and the third column gives the annual compound growth rates for each industry's final demand. The data in this table are for

Table 18. Final Demand, by Industry, for the Northeast Ga. Area for 1972 and 1980, and Annual Growth Rates in Final Demand 1972-1980. (Households Exogenous)

Industry	1972 FD	1980 FD	Annual Growth Rate (%)
1) Agriculture	27820.4	37825.915	3.915003
2) Mining	15816.2	19894.267	2.9089674
3) Contract Construction	306462	460752.66	5.2292317
4) Food and Kindred Products	276984	398714	4.6588227
5) Textile Mill Products	189113	260215.71	4.0702298
6) Apparel and Related Products	119844	173277.26	4.7166303
7) Lumber and Wood Products	4198.19	5905.1338	4.3656811
8) Furniture and Fixtures	16754.8	24903.21	5.0786555
9) Paper and Allied Products	13849	19438.03	4.3288037
10) Printing and Publishing	6008.04	9139.2677	5.3834274
11) Chemicals and Allied Products	16751.7	23452.216	4.295513
12) Petroleum Refining	17944.3	24558.014	3.9999992
13) Rubber and Misc. Plastics	30032.1	42056.06	4.2990506
14) Leather and Leather Products	21416.6	31544.401	4.9594313
15) Stone, Clay and Glass Prod.	28052.3	38627.042	4.0795416
16) Primary Metal Industries	30687.4	42013.764	4.0049314
17) Fabricated Metal Products	29707	40977.268	4.1023478
18) Machinery, Except Electrical	35290.1	49865.506	4.4163272
19) Electrical Machinery & Equip.	113724	156515.79	4.0730417
20) Transportation Equipment	95392.9	144811.55	5.3563923
21) Miscellaneous Manufacturing	34250.5	47819.986	4.260023
22) Transportation Services	11451.4	18512.606	6.1881661
23) Communications & Utilities	60099.7	94292.176	5.7914123
24) Wholesale and Retail Trade	246150	392392.14	6.0022429
25) Finance, Ins., Real Estate	133957	213991.38	6.0300231
26) Services	279871	431260.1	5.5535078
27) Federal Government Enterprises	2151.07	3504.9517	6.2926993
28) State & Local Govt. Enterprises	12233.3	15780.211	3.2336175
29) Unallocated Industries	2524.4	4181.2827	6.5108672
	(Thousands of Dollars)		

households treated as exogenous, Table 19 shows final demand when households are treated as an endogenous industry. Values of final demand decrease when households are treated endogenously because the household consumption column is moved from the final demand columns into the inter-industry matrix; however, upon observation, industries remain in the same position relative to each other.

6.4 I-O Projections

The following projections were made:

1) Standard I-O projection with final demand projections as given in the previous section;

2) I-O projection with households endogenous;

Comparisons were made between consumption expenditures as given in 2, with those in section 6.3.

The comparisons are shown in Table 20; this table shows the household consumption column as projected exogenously and as calculated endogenously. As can be seen, the difference between the two is very small, the average error being 7.5%, hence it is possible to assume that the projection of household consumption seems reasonable.

Table 21 shows the Total Gross Outputs required by each industry in the area, to meet the projected final demand when households are treated exogenously and Table 22 shows gross outputs required when households are endogenous. For the former case, the sum of the gross outputs if 4,566 millions of dollars or a total increase of 48% over the 1972 figure. In the latter case, the sum of the gross outputs (including households but excluding other final payment sectors) was 6,703 millions

Table 19. Final Demand, by Industry, for the Northeast Ga. Area for 1972 and 1980, and Annual Growth Rates in Final Demand 1972-1980 (Households Endogenous)

Industry	1972 FD	1980 FD	Annual Compound Growth Rate (%)
1. Agriculture	21757.95	28082.781	3.2411337
2. Mining	15776.443	19830.373	2.8999642
3. Contract Construction	306462	460752.66	5.2292317
4. Food and Kindred Products	196724.5	269726.7	4.0239125
5. Textile Mill Products	183383.4	251007.51	4.0017948
6. Apparel and Related Products	81640.4	251007.51	4.0017948
7. Lumber and Wood Products	3549.992	4867.3966	4.0240288
8. Furniture and Fixtures	8834.2002	12173.79	4.0895954
9. Paper and Allied Products	12273.21	16905.533	4.0839672
10. Printing and Publishing	2639.91	3726.2511	4.4023737
11. Chemicals and Allied Products	15239.58	21022.045	4.1028798
12. Petroleum Refining	17944.3	24558.014	3.9999992
13. Rubber and Misc. Plastics	26378.96	36184.996	4.0300608
14. Leather and Leather Products	12051.43	16493.373	4.0001243
15. Stone, Clay and Glass Prod.	27272.892	37374.434	4.0172637
16. Primary Metal Industries	41986.23	41986.23	4.0036693
17. Fabricated Metal Products	28653.58	39284.287	4.0231481
18. Machinery, except Electrical	34424.532	48474.428	4.3711767
19. Electrical Machinery & Equip.	112556.56	154639.56	4.050392
20. Transportation Equipment	42988.001	60590.163	4.3835
21. Miscellaneous Manufacturing	31802.81	43886.234	4.1077003
22. Transportation Services	1021.9	1751.0627	6.9637597
23. Communications & Utilities	29223.8	44670.647	5.447355
24. Wholesale and Retail Trade	19433	48028.862	4.6846971
25. Finance, Ins., Real Estate	14559	22103.489	5.3576693
26. Services	113848	164439.87	4.7032624
27. Federal Government Enterprises	446.16	764.94286	6.9713041
28. State & Local Government Ent.	10229.95	12560.571	2.5987282
29. Unallocated Industries	2524.4	4181.2827	6.5108672
30. Households	532198.7	836380.86	5.8135495
	(thousands of dollars)		

Table 20. Comparison Between the Household Consumption in 1980 as Projected for the Northeast Ga. Area and Household Consumption Derived from the Area I-O Model When Households are Assumed Endogenous

	Industries	Calculated Household Consumption	Projected Household Consumption
1.	Agriculture	9012.8197	9743.1343
2.	Mining	59.105556	63.894916
3.	Contract Construction	*	*
4.	Food and Kindred Products	119318.82	128987.3
5.	Textile Mill Products	8517.9839	9208.2015
6.	Apparel and Related Products	56795.876	61398.083
7.	Lumber and Wood Products	963.65194	1041.7373
8.	Furniture and Fixtures	11775.262	12729.42
9.	Paper and Allied Products	2342.6685	2532.4965
10.	Printing and Publishing	5007.274	5413.0167
11.	Chemicals and Allied Products	2248.0127	2430.1706
12.	Petroleum Refining	*	*
13.	Rubber and Misc. Plastics	5430.988	5871.0643
14.	Leather and Leather Products	13922.851	15051.029
15.	Stone, Clay and Glass Prod.	1158.717	1252.6085
16.	Primary Metal Industries	25.570104	27.533963
17.	Fabricated Metal Products	1566.0805	1692.981
18.	Machinery, except Electrical	1286.8079	1391.0787
19.	Electrical Machinery & Equip	1735.5898	1876.2257
20.	Transportation Equipment	77908.422	84221.392
21.	Miscellaneous Manufacturing	3638.89	3933.7516
22.	Transportation Services	15505.151	16761.543
23.	Communications & Utilities	45902.056	49621.529
24.	Wholesale and Retail Trade	337051.76	364363.28
25.	Finance, Ins., Real Estate	177504.58	191887.9
26.	Services	246820.24	266820.24
27.	Federal Government Enterprises	2534.6265	2740.009
28.	State & Local Government Enterprises	2978.3062	3219.6402
29.	Unallocated Industries	*	*
30.	Households	14224.852	15377.002
		(thousands of dollars)	

*Data not available.

Table 21. Total Gross Outputs for the Northeast Ga. Area for 1972 and 1980, and Annual Growth Rates and Total Growth of Total Gross Outputs, 1972-1980 (Households Exogenous)

	1972 G.O.	1980 G.O.	ACGR %	TOT. GRW.
1. Agriculture	140031	199922.65	4.551369	42.770275
2. Mining	27395.7	36645.433	3.7032053	33.763449
3. Contract Construction	339220	510084.09	5.2313253	50.369696
4. Food and Kindred Products	331220	477173.98	4.6694696	44.065571
5. Textile Mill Products	278407	386371.54	4.1815028	38.77939
6. Apparel and Related Prod.	141249	204418.71	4.7289878	44.722235
7. Lumber and Wood Products	32377.4	47883.28	5.012905	47.891058
8. Furniture and Fixtures	19768.4	29435.305	5.1022768	48.900789
9. Paper and Allied Products	39201.5	56053.12	4.5712098	42.98718
10. Printing and Publishing	21354.3	32513.773	5.3956658	52.25867
11. Chemicals and Allied Prod.	36292.1	51136.805	4.379493	40.903406
12. Petroleum Refining	21838.4	30397.737	4.220356	39.193974
13. Rubber and Misc. Plastics	43536	61802.208	4.4766963	41.95656
14. Leather and Leather Prod.	27381.6	40295.631	4.948175	47.16317
15. Stone,Clay and Glass Prod.	51296	73053.605	4.5188844	42.415793
16. Primary Metal Industries	57221.5	80195.943	4.3095663	40.150018
17. Fabricated Metal Products	66981.2	96464.121	4.665032	44.01671
18. Machinery, except Elec.	49246.5	70364.74	4.5616582	42.88272
19. Electrical Machinery & Equip.	127300	176397.4	4.1616783	38.56826
20. Transportation Equipment	119769	181625.5	5.3426027	51.646493
21. Miscellaneous Manufacturing	47798.3	67276.725	4.365401	40.751292
22. Transportation Services	49969.4	75029.893	5.2122414	50.151679
23. Communications & Utilities	107884	166275.29	5.5562198	54.124137
24. Wholesale and Retail Trade	320507	502175.27	5.7735845	56.68153
25. Finance, Ins., Real Est.	173103	274052.64	5.9110254	58.31767
26. Services	360056	551650.21	5.477959	53.212335
27. Federal Government Ent.	8275.46	12855.145	5.659999	55.340548
28. State & Local Government Enterprises	21581.5	30264.563	4.3173611	40.233823
29. Unallocated Industries	29505.9	44388.718	5.2374855	50.440141
	(thousands of dollars)			

Table 22. Total Gross Outputs for the Northeast Ga. Area for 1972 and 1980, and Annual Growth Rates and Total Growth of Total Gross Outputs, 1972-1980 (Households Endogenous)

Industries	1980 OUTPUTS COMPARED TO 1972 OUTPUTS 1972	1980	ACGR %	TOT GRW %
1. Agriculture	140031	194987.44	4.2252168	39.245911
2. Mining	27395.7	36532.902	3.6633447	33.352685
3. Contract Construction	339220	508031.85	5.1783085	49.76471
4. Food and Kindred Products	331220	465383.64	4.3426394	40.5059
5. Textile Mill Products	78407	383798.25	4.0945172	37.855101
6. Apparel and Related Prod.	32377.4	47133.816	4.8060432	45.416536
7. Lumber and Wood Products	32377.4	47133.816	4.8060432	45.576286
8. Furniture & Fixtures	19768.4	28351.154	4.6104088	43.416536
9. Paper and Allied Products	39201.5	55060.047	4.3378145	40.453928
10. Printing and Publishing	21354.3	31163.886	4.8384964	45.937288
11. Chemicala and Allied Prod.	36292.1	50604.813	4.243134	39.437541
12. Petroleum Refining	21838.4	30327.046	4.1900292	38.870273
13. Rubber and Misc. Plastics	43536	60938.616	4.2930827	39.972931
14. Leather and Leather Prod.	27381.6	38882.417	4.4808745	42.00199
15. Stone, Clay and Glass Prod.	51296	72680.945	4.4520885	41.689303
16. Primary Metal Industries	57221.5	79927.595	4.2658731	39.681055
17. Fabricated Metal Products	66981.2	95589.967	4.5460001	42.711635
18. Machinery, except Electrical	49246.5	69921.275	4.4790566	41.982222
19. Electrical Machinery & Equip.	127300	176004.44	4.1326448	38.259574
20. Transportation Equipment	119769	173837.77	4.7671095	45.144206
21. Miscellaneous Manufacturing	47798.3	66641.963	4.2418033	39.423291
22. Transportation Services	49969.4	72666.318	4.7921196	45.421634
23. Communications & Utilities	107884	159984.93	5.0485954	48.293471
24. Wholesale and Retail Trade	320507	472743.97	4.9780637	47.498795
25. Finance, Ins., Real Estate	173103	256867.55	5.0571412	48.390002
26. Services	360056	527629.82	4.892613	46.541042
27. Federal Government Ent.	8275.46	12238.553	5.0128013	47.889706
28. State & Local Government Enterprises	21581.5	29303.388	3.897363	35.780127
29. Unallocated Industries	29505.9	43170.655	4.8721015	46.31194
30. Households	1522870	2263890.3	5.0809681	48.65946

(thousands of dollars)

of dollars or a 45% increase over the 1972 figure.

If the projections are correct (if we assume them to be correct the region's gross output can be expected to increase at an annual compound growth rate of 5%.

Table 23 shows the employment required in each industry to produce 1980 gross outputs under two different assumptions, i.e., that productivity in 1980 will be the same as in 1972 and that productivity in the area will change according to growth rates calculated for the State (64, p. 90).

As can be seen, if productivity were not to increase, more employment would be required in every industry as shown in the third column. However, since this unlikely, employment required to produce 1980 gross outputs should be as calculated when using productivity projections. The table also shows total growth of employment over the period and an annual compound growth rate given that productivity projections were used.

In several industries, a decrease in employment is expected to occur, the labor released from agriculture will most likely be absorbed by manufacturing. It is interesting to note an expected decrease in the textile mill industry and a phenomenal increase in employment in the leather industry, attributed most likely to a slow productivity increase. The exact opposite happens in chemicals and petroleum refining industries due to their exceptionally high growth rate in productivity.

6.5 Additional Projections

In order to observe the impact of diminished growth in the Area's three strongest industries -- food, textile, and apparel -- for 1980,

Table 23. Employment Projections for the Northeast Ga. Area to 1980

	Industry	Empl. 1972	Empl. 1980	Proj. Empl. 1980	Proj. Prod. Incr. (%)	Total Growth (%)	Annual Cpd Gr. Rate
1.	Agriculture	1671	2385.6913	1600.0425	5.15	-4.2464107	-.54093301
2.	Mining	702	941.69467	705.80603	3.67	.25653849	.03203154
3.	Contract Construction	8564	12877.661	10735.74	2.30	25.358945	2.8654218
4.	Food and Kindred Products	6644	9571.7163	7202.3643	3.61	8.4792926	1.0225564
5.	Textile Mill Products	10732	14893.804	10401.223	4.59	-3.0821607	-.39056838
6.	Apparel and Related Products	11649	16858.693	13977.912	2.37	19.992375	2.3043737
7.	Lumber and Wood Products	1352	1999.4871	1523.1367	3.46	12.65804	1.500988
8.	Furniture and Fixtures	737	1097.3988	855.60604	3.16	16.093084	1.8827811
9.	Paper and Allied Products	877	1253.9976	967.15076	3.3	10.279447	1.230602
10.	Printing and Publishing	949	1444.9347	1114.4118	3.3	17.430116	2.0287186
11.	Chemicals and Allied Products	928	1307.5834	904.82418	4.71	-2.4973944	-.31564087
12.	Petroleum Refining	527	733.55225	492.73038	5.1	-6.5027744	-.31564087
13.	Rubber and Misc. Plastics	1440	2044.1744	1601.2115	3.1	11.195241	1.3353035
14.	Leather and Leather Products	1361	2002.8907	1837.9574	1.08	35.044632	3.8268462
15.	Stone, Clay and Glass Prod.	2193	8123.1783	2425.6191	3.21	10.607347	1.2681782
16.	Primary Metal Industries	1464	2051.7963	1586.1377	3.27	8.3427414	1.0066524
17.	Fabricated Metal Products	1818	2618.2238	2158.9881	2.44	18.756224	2.172035
18.	Machinery, except Electrical	1374	1963.2086	1590.0764	2.67	15.726085	1.842466
19.	Electrical Machinery & Equip.	4077	5649.428	4449.3334	3.03	9.1325343	1.0983989
20.	Transportation Equipment	1845	2797.878	2380.4839	2.04	29.023516	3.23658
21.	Miscellaneous Manufacturing	1761	2478.6302	1815.2961	3.97	3.0832514	.38030446
22.	Transportation Services	1498	2249.2721	1708.1234	3.50	14.026925	1.6543403
23.	Communications & Utilities	2536	3908.5882	2523.775	5.62	-.48206002	-.06038547
24.	Wholesale & Retail Trade	19413	30416.585	24578.023	2.7	26.606001	2.9927805
25.	Finance, Ins., Real Estate	3346	5297.3093	4317.3289	2.59	29.029552	3.2371834
26.	Services	8415	12892.818	11038.481	1.96	31.176241	3.4503341
27.	Federal Government Enterprises		----- Data not available for Govt. Ent. -----				
28.	State & Local Government Ent.		----- Data not available for Govt. Ent. -----				
29.	Unallocated Industries		----- Data not available -----				

additional projections were made given the following expectations:

1) Final demand in all three industries would be the same in 1980 as it was in 1972;

2) Final demand in the industries would increase to 25% of their 1972 levels;

3) Final demand would increase to 35% of 1972 levels.

Table 24 summarizes the results of the projections in terms of how gross outputs and local sales would be affected. The first case seems to set the lower bound on what could occur and so it can be treated as the worst possible case. As can be appreciated, any decrease in the level of production of these three industries has some effect that cannot be regarded as minor.

Table 24. Original 1980 Projections for the Northeast Ga. Area Compared to 1980 Projections Given Assumptions of Slow Industrial Growth in Food and Kindred Products, Textile Mill Products, and Apparel Industries Between 1972 and 1980

	Orig. Proj.	Same as 1972	25%	35%
Total Local Gross Outputs ($)	4566.2	4179.5	4408.7	4498.2
ACGR (%)	5.0	3.85	4.54	4.8
Total Growth (%)	47.78	35.26	42.68	45.58
Total Local Sales ($)	1339.98	1199.5	1282.2	1314.5
ACGR (%)	4.74	3.29	4.16	4.48
Total Growth (%)	45.2	21.1	38.5	42.3

(Dollar Figures are in millions)

CHAPTER VII

INDUSTRIAL DEVELOPMENT AND THE I-O MODEL

7.1 Industrial Development Planning

Industrial development planning can be thought of as the process by which industries are selected and attracted to the region in order to utilize the factors of production available in such a manner so as to increase the standard of living of the region's inhabitants.

A successful industrial development plan will usually contain the following elements:

1) Formulation of development objectives, with emphasis on economic growth and stability, and a system of priorities for these objectives in order to make development policy decisions;

2) programs of economic research such as data collection and model building, in order to quantify economic growth and "gauge" development progress, and to select industries needed in the region; and

3) promotion of investment, i.e., attracting industry with methods such as government (local and State) subsidies, industrial estates, tax-free periods up to four or five years and others.

7.2 Development Objectives and Priorities

It is reasonable to establish quantitative development goals in order to "gauge" the progress of economic growth in the region; however, it is through a system of priorities that one objective overshadow

another when policy decisions are being made. Priorities are highly subjective and relative to the particular situations, hence, they are dynamic in nature since, at a certain stage of development, objective "A" could hold a higher priority than objective "B" and at a subsequent stage, the reverse situation may hold true.

Setting development objectives is a rather difficult task; the following have been collected from some authors (17,20,46,62):

1) Economic growth: to increase regional per capita personal income,

2) economic stability: achieving balanced growth in order to maintain cyclical stability,

3) public sector capability: adequate infrastructure facilities to meet demands of industrialization and adequate social institutions (e.g., education and health) demanded by the increasing population;

4) quality of life: maintaining and improving the overall quality of the human environment in the region.

Other objectives that are corollaries to the above would be providing assistance to distressed areas, steady growth and full employment.

7.3 Economic Research -- Selection of Industries

The objectives given in the previous section, when used as criteria for industry selection, may sometimes cause conflicts to arise. For example, an industry which may increase regional per capita personal income, may be a dangerous polluter or may require more infrastructure services than what its taxes cover. Hence, it becomes necessary to use a technique, or preferably, a combination of techniques which will select

the industries desired in the region, i.e., those industries which "optimize" the objectives according to their assigned priorities.

A study of the forces determining industrial location, a shift-share analysis, and the I-O model combined can provide answers to the question of industry selection.

7.3.1 Industrial Location Principles

A complex group of forces determine industrial location, the underlying force being, of course, cost considerations. Manufacturing industries fall into four major categories of location types (48, pp. 22-24):

1) Resource orientation: Industries which tend to locate near the raw-materials source usually manufacture goods whose materials cost is 60% or more of the final value of the processed good,

2) market orientation: Industries which tend to locate near their markets usually manufacture goods whose assembly and distribution costs exceed 30% of total cost for the product,

3) labor orientation: Industries which tend to locate near a good labor force supply usually manufacture goods whose labor costs exceed 20% of the total product cost,

4) foot-loose orientation: Industries of this type do not have any major cost element of materials, assembly and distribution, or labor, and hence, can locate anywhere according to considerations decided upon by management, for example, recreation and housing facilities for their employees, number of sunny days in the year, etc.

Therefore, for the area under study, assessment of the relative quantities of location factors, such as labor force availability (or skilled labor), raw materials, or proximity to large markets, will help

determine capacity expansion of existing industrial activity of possible new industrial activities which can be attracted into the region. Finally, factors of location such as recreation facilities, skilled labor, housing, etc., can be "created" in the region through some type of government subsidy in order to attract industries which otherwise would not locate in the region.

7.3.2 Shift-Share Analysis

The technique offers a comprehensive and direct tool for relating either industrial or regional growth to the overall national growth pace in terms of earnings or other economic variables.

The basis for its use is that, in the long run, regional industrial structure should become similar to the national industrial structure. The major factor in the increasing structural similarity (3) is the continuous migration of labor from agricultural and other resource-based industries to urban areas and manufacturing activities. Therefore, regions with favorable industrial mix eventually adjust downwards while those regions with less favorable industrial mix adjust upwards and reach or exceed national industrial mix, producing a high regional share component.

7.3.3 Input-Output Analysis

In terms of the development objectives mentioned in section 7.2, I-O analysis satisfied each in the following manner.

7.3.3.1 Economic Growth: Through the use of the income, output, and employment multipliers, I-O analysis provides the researcher with information regarding the impact on increase in sales to final demand

by any given industry would have on that industry and all other industries in the area. The impacts, of course, would be in terms of increases or decreases in income, output, and employment. It will sometimes be the case, however, that the industry which has a high income-increasing impact may also have a low employment-decreasing effect, and vice versa.

Choosing industries whose multipliers have higher than average values may not be the correct solution either, as will be explained in the following paragraphs.

Personal per capita income growth in the region will occur if the income payments in the new activity exceed the average of those previously earned in the region and to the extent that these incomes go to the residents of the region, per capita income on the region will rise. If income levels in the new activity are lower than the previous average level in the region, the new activity can still raise the region's average per capita income but only by hiring those already in the region previously out of work or earning lower incomes.

If the new activity purchases its inputs from outside the region (low output multipliers), no secondary income effects will occur in the region. If it purchases inputs from within the region, regional personal income will rise to the extent that supplying industries increase labor inputs from within the region.

Creation of new jobs in a region may defeat regional income objectives of the new jobs are filled by in commuters (non-residents who work in the area) or by immigrants from other regions if their income levels fall below average income per capita in the region.

7.3.3.2 Economic Stability: The three main forces of concern here are:

1) Vertical Integration.

2) Diversification

3) Balanced growth.

Vertical integration (48, p. 79) refers to introducing industries in that which either extend backwards to control its raw material supplies or forward to insure market outlets for finished products. The underlying basis for vertical integration is that it is desirable to keep as much of the value added by manufacture within the region as the "product" is transformed from raw material to finished product.

Backward integration can be considered as import substitution and forward integration can be considered as export substitution in somewhat of a loose sense.

From an I-O table, import substitution possibilities can be investigated with the use of the import table's row sums, i.e., total imports to the region originating in extraregional industry i. If a sufficiently high level of disaggragation is used, it becomes possible to find out exactly what products are being imported in the region. Another method, although not quite as accurate, is to look at the percentage of its total purchases an industry imports. Figure 19 shows these percentages; primary metals and petroleum refining are industries which use products not available in the area, hence their percentages are high. It is useful to investigate on an industry by industry basis, especially those with high import-to-total purchases ratios, the nature of the materials they import.

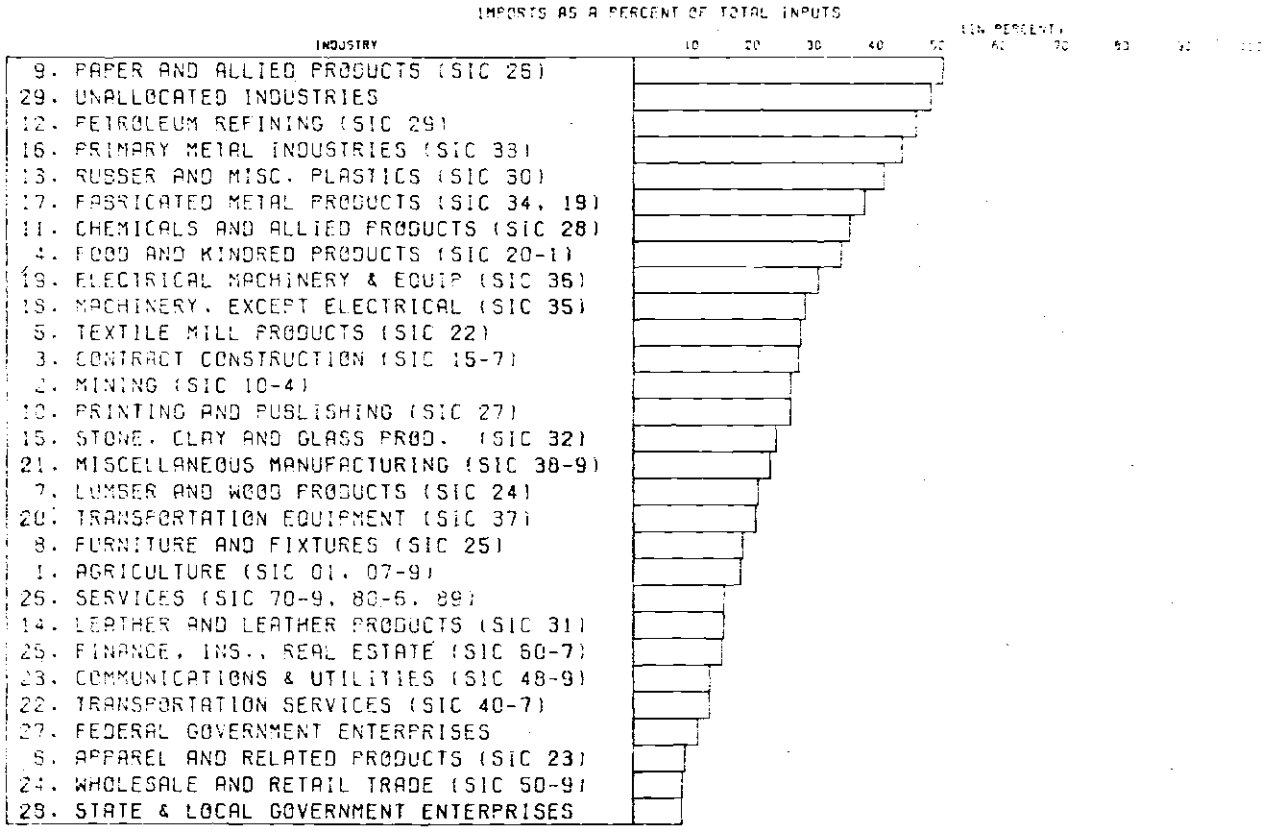


Figure 19. Imports by Area Industry j as a Percent of Industry j's Total Purchases, 1972.

Table 25 shows another useful set of data extracted from an I-O model. They are trade balances of each industry and were derived by subtracting the number of dollars an industry imports from the number of dollars that same industry exports. Industries with a negative trade balance are easily recognizable and should be analyzed more closely for possibilities of import substitution.

Diversification (48, p. 79) refers to the concept of attracting as many unlike industries as possible, i.e., it is the opposite of specialization as defined in section 4.3.

The rationale for diversification is that in times of economic stress, such as during a recession, diversified regions will frequently fare better than specialized ones. A downturn in the economy usually affects different industries to different degrees but there is a high degree of probability that a specialized region whose major industry is affected, is likely to become a depressed area.

Specialization or diversification can be calculated from data obtained directly from the I-O table.

Balanced regional economic growth can be interpreted in many ways, but of interest are the following aspects:

1) Development in the region is said to be unbalanced or out of balance when it is not up to the national average (excepting, of course, industries for which there exists no comparative advantage in the area as in the nation, mining is a case in point),

2) Certain elements in the economic development of a region lag behind other elements and a "catching-up" is necessary.

Table 25. Trade Balances for Industries in the Northeast Ga. Area, 1972

	Industry	Trade Balance (millions of $)
1.	Agriculture	-3.6
2.	Mining	8.614
3.	Contract Construction	48.452
4.	Food and Kindred Products	81.6
5.	Textile Mill Products	105.93
6.	Apparel and Related Products	69.221
7.	Lumber and Wood Products	-3.231
8.	Furniture and Fixtures	4.502
9.	Paper and Allied Products	-7.952
10.	Printing and Publishing	-3.265
11.	Chemicals and Allied Products	1.808
12.	Petroleum Refining	7.808
13.	Rubber and Misc. Plastics	8.227
14.	Leather and Leather Products	7.879
15.	Stone, Clay and Glass Prod.	14.95
16.	Primary Metal Industries	5.253
17.	Fabricated Metal Products	2.512
18.	Machinery, except Electrical	6.722
19.	Electrical Machinery & Equip.	68.38
20.	Transportation Equipment	4.875
21.	Miscellaneous Manufacturing	18.86
22.	Transportation Services	-6.42
23.	Communications & Utilities	11.47
24.	Wholesale and Retail Trade	-7.535
25.	Finance, Ins., Real Estate	-14.052
26.	Services	49.052
27.	Federal Government Enterprises	-0.903
28.	State & Local Government Enterprises	8.318
29.	Unallocated Industries	-13.799

Balance in growth can be observed with the use of what is known as Location Quotients (LQi) (48, p. 78):

$$LQi = \frac{\text{Earnings or employment in industry i in the area}}{\text{Total Earnings or Employment in the area}} \Big/ \frac{\text{Earnings or employment in industry i in the U.S.}}{\text{Total Earnings or Employment in the U.S.}}$$

If LQi is greater than one, then the region has a higher concentration of economic activity in industry i than does the national industry i in the nation and the reverse if LQi is less than one. Area data can be extracted from the I-O table and national data from a national I-O table for the same year.

Location quotients become useful in that they determine whether an area industry lags behind the nation or not; shift-share data, however, goes into a little more detail, and therefore, may be more useful.

From Tables 26 and 27 it is possible to note that the area obtains a greater proportion of its earnings, as compared to the U.S. or Georgia, in Agriculture, Manufacturing, and State and local government enterprises broad industry sectors. Having a higher proportionate share in Agriculture and State and local government enterprises means that the Area shows characteristics of being underdeveloped relative to the U.S. and Georgia (to a lesser extent). Location quotients will describe in quantitative terms where the Area should increase output in order to maintain a "balance" in growth.

7.3.3.3 Public Sector Capability: With the use of I-O analysis, it is possible to obtain a set of government-income multipliers which provide an estimate of the range over which both local and State government

Table 26. Location Quotients Calculated by Comparing Northeast Ga. Area Broad Industry Earnings to Georgia Broad Industry Earnings, 1950, 1959, 1970

	1950	1959	1970
Agriculture	1.23	1.39	1.11
Mining	2.19	0.68	0.80
Contract Const.	0.85	1.18	0.98
Manufacturing	1.28	1.23	1.33
Transp., Comm., P.U.	0.65	0.80	0.83
Trade, (W & R)	0.95	0.93	0.93
Fin., Ins., R.E.	0.74	0.80	0.48
Services	0.93	0.97	0.95
Fed. Govt. (Civilian)	0.58	0.57	0.69
Fed Govt. (Military)	0.31	0.27	0.25
State & Local Govt.	1.31	1.19	1.31

Table 27. Location Quotients Calculated by Comparing Northeast Ga. Area Broad Industry Earnings to National Broad Industry Earnings, 1950, 1959, 1970

	1950	1959	1970
Agriculture	1.78	1.99	1.42
Mining	0.45	0.23	0.35
Contract Const.	0.77	1.03	0.85
Manufacturing	1.08	1.05	1.22
Transp. Comm., P.U.	0.64	0.83	0.90
Trade (W & R)	0.97	0.98	1.02
Fin., Ins., R.E.	0.64	0.76	0.48
Services	0.91	0.90	0.79
Fed. Govt. (Civilian)	0.80	0.82	0.93
Fed. Govt. (Military)	0.48	0.58	0.51
State & Local Govt.	1.14	1.06	1.15

evenues could be expected to rise for each dollar change in the final demand for industries in the study area.

As government revenues from development rises, local government expenditures necessarily rise in order to provide the essential government services to the new activities. Therefore, the relative quality of local government services falls if the revenues cannot keep up with the expenditures. Hence, of interest is selecting industries which meet the following criteria (17):

1) Industries which generate taxes adequate to meet the associated public service requirements, given the existing tax structure;

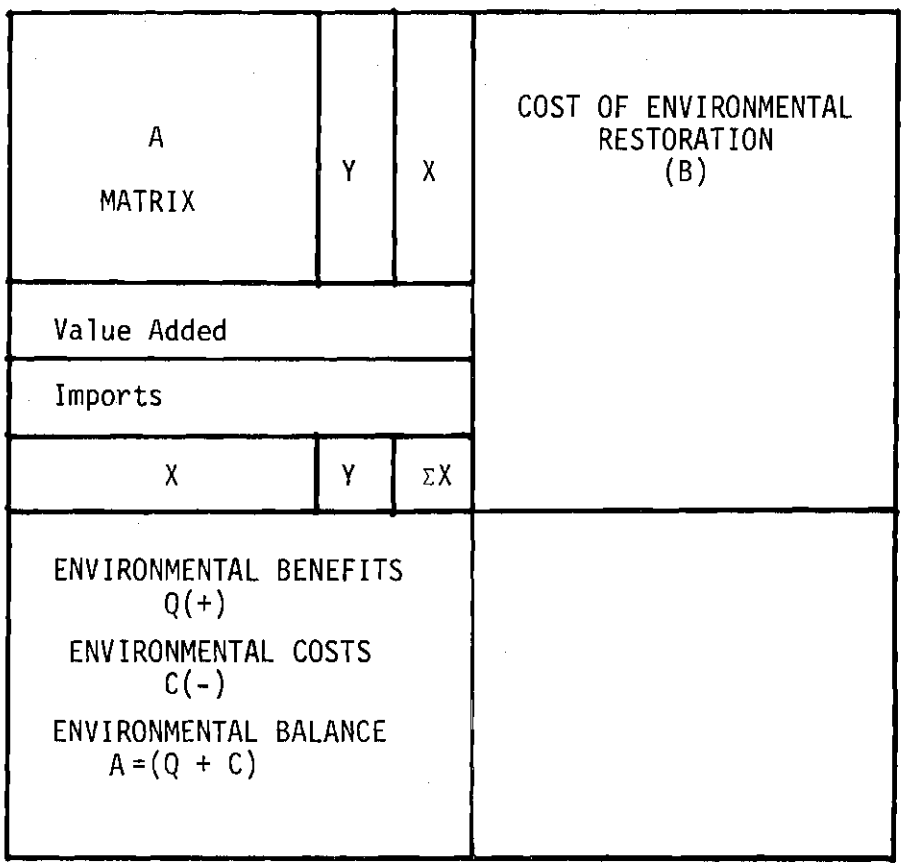
2) Industries which employ a labor force with income levels, residential standards, and tax payments sufficiently high enough to support their public service requirements.

7.3.3.4 Quality of Life: Although in the stages of development, environmental impacts can be included in an I-O model. Reasons for the difficulty in incorporating "environmental" rows and columns are numerous and result from the fact that:

1) Environmental data are more difficult to obtain than are the conventional economic statistics and may require extensive estimation and subjective judgement:

2) The natural environment is hardly conceivable as a conventional industry with a production function and distribution pattern.

Of the several studies available, Cumberland's treatment seems reasonable to mention here (17). As can be observed in Figure 20, a row and a column have been added to account for environmental impacts of increasing production in a given industry or of introducing a new activity.



Source: (17, p. 65)

Figure 20. The Cumberland I-O Table Including Environmental Rows and Columns.

Row A is intended to measure the environmental effects of any development plan, it consists of estimated dollar measurements of any environmental benefits (Q), by sector, and environmental costs (C), by sector. The entries in column B are defined as the costs which would have to be incurred by the public or private sectors of the regional economy in order to neutralize any adverse environmental affects and to restore the environment to quality levels acceptable by public health, ecological, aesthetic, or other relevant standards.

7.4 Energetic Promotion of Investment

Once the appropriate selection of industries has been made the region is in a position to attract the industries which "optimize" the objectives given in section 7.2 through investment promotion methods.

It is important to note that methods such as industrial estate establishment, subsidies, or five-year tax-free benefits for new firms may backfire insofar as the expenditures (or revenues lost) may exceed the benefits or external economies to the region which the local Industrial Development agency expected.

7.5 Conclusion

No single model can report objectively all of the significant aspects of an undertaking as complex as regional economic development planning. The I-O model can, however, provide the data necessary for making industry selection in that it

1) Evaluates the impacts of an expansion of an industry on the rest of the regional economy with regard to income, output, employment, and government income;

2) It provides a measure of interdependency of industries, through the use of backward and forward linkage data which give some insight into import or export substitution possibilities;

3) With some modifications, it is possible to insert a new industry row and column in order to evaluate the impact of the new activity in the regional economy;

4) It is capable of producing a forecast of total gross outputs disaggregated by industry given final demand projections.

No model can be devoid of drawbacks, however and the I-O model is no exception:

1) Assumptions regarding linear homogeneous production functions are not always true in real industrial situations,

2) Coefficient instability due to changing trade patterns and technological change make the static model somewhat doubtful in terms of results reported for long term forecasts,

3) There is a large amount of investment required in terms of time and money when building an I-O model for primary sources alone, as is the case for the U.S., the cost of which would have to be compared to the expected benefits of having such a planning model.

It seems reasonable, however, that despite these drawbacks I-O provides sufficient amount of data required in order to make a development plan for a region. With the use of linear programming (27,5), a multi-criterion objective function model (40) could be set up subject to constraints of future gross outputs required and employment availability, that would optimize the objectives of economic growth, stability, and

public sector capability. Priorities or weights would have to be assigned to each objective in order to use such a model. A model like this is suggested because it is more efficient than calculating discrete impact effects in that the solution reported by the multi-criterion model will search all possible impacts and report the most suited to meet the objectives.

APPENDICES

APPENDIX A

CONSTRUCTION OF THE MODEL

A.1 Data Sources

In order to construct the Northeast Georgia Area I-O Model, primary and secondary data from several sources were utilized. Primary data used was the unpublished "covered" employment by detailed industry for the area provided by the Georgia Department of Labor (23).

Secondary sources were 1967-1972 OBE Earnings Worksheets (79) Census of Agriculture (1969) (77) County Business Patterns (1970-1972) (78) Georgia Commuting Patterns for 1970 (24) and the 1970 Georgia Economic Model constructed by Schaffer et al., which is the 300-industry I-O model of Georgia (64).

A.2 Data Worksheets

Worksheets were prepared in order to facilitate the determination of data requirements. As shown in Figure A.1, the worksheets arrange the data into an orderly format, sources of data and methods of calculation are presented where appropriate.

A.3 The I-O Computer Package

A.3.1 Summary

A number of programs from the I-O package used to build the 1970 Georgia Model were used, with some adjustments, in the construction of the area model.

Household (Personal) Income Summary

(Thousands of dollars)

Earnings:			
Farm	29679		
Mining	5138		
Contract construction	83451		
Manufacturing	369923		
Trans., comm., and pub. utilities	45022		
Wholesale and retail trade	144647		
Fin., ins., real estate	34409		
Services	103371		
Others	4646		
Federal government enterprise	6086 1/		
State and local gov't enterprise	3166 2/		
Total industrial earnings		829538	
Local government payrolls (less enterprises)	89409 3/		
State government payrolls (less enterprises)	42143 4/		
Total state and local gov't payrolls		131552	
Federal civil gov't payrolls (less enterprises)	28041 5/		
Federal military payrolls	11821		
Total federal gov't agency payrolls		39862	
Total earnings			1000952
Property income			161133
Transfer payments:			
Local government transfers to households	5844 6/		
State government transfers to households	21725 7/		
Federal government transfers to households	120418 8/		
Total transfer payments			147988
Total personal income (including social insurance contribution)			1310073
Residence adjustment (or net commuting income)			212798
Total personal income of residents			1522871

Household (Personal) Income Summary

Sources:

Earnings: Direct from published personal income tables or from summed values if more than one county is involved with the exceptions of earnings from government enterprises and general government agencies.

Earnings from federal government enterprises (e.g., postal service, military exchanges, etc.) and from state and local government enterprises (e.g., utilities, transportation facilities, public housing, etc.) are estimated on the same proportion as for the state of these government payrolls. The computations are as follows:

1) Federal government enterprise payrolls:

$$.178389 \times \frac{34127}{\text{(Fed. civil gov't earnings)}} = \frac{6086}{}$$

2) State and local government enterprise payrolls:

$$.023502 \times \frac{134718}{\text{(S&L gov't earnings)}} = \frac{3166}{}$$

Earnings from general government agencies are computed as the remainder in the case of the federal government. If no other estimates are available, we split the remainder for state and local governments in proportion to the state split:

3) Local government payrolls (less enterprise):

$$.663573 \times \frac{134718}{\text{(S&L gov't earnings)}} = \frac{89409}{}$$

4) State government payrolls (less enterprise):

$$.312825 \times \frac{134718}{\text{(S&L gov't earnings)}} = \frac{42143}{}$$

Check note: (2), (3), and (4) should sum to equal state and local government earnings.

5) Federal civil government payrolls (less enterprise

$$\frac{34127}{\text{Fed. civil gov't earnings}} - \frac{6086}{\text{(1) above}} = \frac{28041}{}$$

Property income: Direct from published personal income tables.

Figure A-1. Data Worksheets.

Transfer payments: Transfer payments, reported as one total in the published personal income tables, are distributed in accordance with the state proportions as follows

6) From local governments x .039492 = 5846

7) From state governments 147988 / Total transfer payments x .146805 = 21725

8) From federal government x .813703 = 120418

GOVERNMENT EXPENDITURES WORKSHEET

Notes and sources:

Government expenditures are estimated as multiples of earnings (from the Household Income Summary), with the multiples based on the ratios of expenditures less household transfers to earnings in the Georgia Economic Model. The expenditures calculated are for goods and services and are the figures inserted into the AFD file read by TOPAREN to construct the initial parameters file. Transfer payments to households are added at a later stage in IO9AM.

For federal government expenditures we have taken the ratio to be federal nonhousehold nondefense expenditures plus household earnings from the federal government divided by earnings. We multiply the ratio by household earnings from the federal government in the area to get an estimate of federal government expenditures. Federal military earnings are not included here. Instead, we treat them as transfers and insert them into total expenditures through a total in IO9AM.

Calculations:

1) Local government expenditures:

1.786392 x 84409 / Local gov't earnings = 159719

2) State government expenditures:

3.718004 x 42161 / State gov't earnings = 156699

3) Federal government expenditures:

2.175105 x 28041 / Fed. civil gov't earnings = 60993

4) Total local government expenditures:

159719 / (1) above + 5864 / Local gov't transfers = 165563

5) Total state government expenditures:

156699 / (2) above + 21725 / State gov't transfers = 178424

6) Total federal government expenditures:

60993 / (3) above + 120418 / Fed. gov't transfers + 11821 / Military earnings = 193232

Figure A-1. (Continued)

The current I-O package has as its data base the 1970 300-industry model of Georgia as well as what is known as the Georgia Parameters File. This file contains dimensions of the I-O model, State employment (or output if employment data was not available) by detailed industry, the OBE-to-SIC (and vice versa) industry classification translations, and the row and column totals of the State transfers matrix.

Upon inputing employment (and output) by detailed industry for the area, the I-O package will construct a model based on the following weighting scheme:

$$\text{Area Transaction}_{ij} = \text{State Transaction}_{ij} * \frac{\text{Area Employment } j}{\text{State Employment } j}$$

The household income row is corrected with the OBE Earnings data, and exports and imports are estimated using the supply-demand pool technique, to be explained in a later section, thus the area model is adjusted to reduce the deviations from estimated area values and known area values. Some changes in the export vector of selected industries were made and finally the model was aggregated to a 29-industry detail. As a result four main tables are produced:

1) Interindustry Transactions
2) Direct Requirements Table
3) Direct and Indirect Requirements Table
4) Direct, Indirect, and Induced Requirements Table.

A.3.2 Main Programs for Area Model Construction

In the following subsections, a brief description of the programs used will be given; Table A.1 shows a summary of what estimates are made at each stage in the process.

Table A.1 Program Flow

Program	Outputs
TOPAR	1st Parameters File
I05	2nd Parameters File 1st Transactions Matrix
I05A	2nd Parameters File 1st Transfers Matrix
I09AM	3rd Parameters File 2nd Transactions Matrix
I010	4th Parameters File 3rd Transactions Matrix 2nd Transfers Matrix
I010A	Capital Formation Matrix
I06	Imports Matrix Exports Vector
I07	Total Transactions Matrix
I08	Aggregation to 29-Industry Detail
I017M	Final Correction Routine

A.3.2.1 TOPAREM. This program arranges the data required for the model construction in a predetermined file known as the area parameters file. Values are read in for:

1) Area Agricultural Outputs as obtained from "Farm Income and Sales" found in Table 13 of the 1969 Census of Agriculture (77).

2) Area Industry Employment as obtained from the ES-202 disk tape provided by the Georgia Department of Labor (23).

3) Area Final Demands, i.e., the household income total and the federal, state, and local government expenditures as obtained from the data work sheets.

4) Area employment not contained in the above files; in our case, construction employment was estimated for the area from data obtained in the County Business Patterns, 1970-1972 (78). Finally, data from the Georgia Parameters File was read in (with the exception of the transfers matrix row and column totals). The program proceeds to produce the Area Parameters File used in IO5.

A.3.2.2 IO5. Using the Area Parameters File created by TOPAREM, this program produces an Area Transactions Table based on the following weighting scheme:

$$AA_{ij} = RA_{ij} * (ATQ_j/RTQ_j) ,$$

where, AA_{ij} = area transactions from industry i to industry j

RA_{ij} = State transactions from industry i to industry j.

ATQ_j = employment (or output) in area industry j.

RTQ_j = employment (or output) in State industry j.

Therefore, this becomes the first estimate of Area transactions, CNGDFF.

A.3.2.3 IO5A. This program applies the weighting scheme described in IO5 to the Georgia transfers matrix in order to produce an Area transfers matrix. Row and column totals of the Area transfers matrix are calculated andinserted into the Area Parameters File.

A.3.2.4 IO9AM. This program essentially corrects the household income row as calculated in IO5 so as to conform to OBE Earnings data.

First, the program reads a file containing earnings of employees by broad industrial sectors: farm, other private non-farm, mining, construction, manufacturing; transportation, communication and public utilities; wholesale and retail trade; finance, insurance and real estate; services; and federal and state and local government enterprises as obtained from the Data Worksheets.

Second, earnings are allocated to each detailed industry within each broad industry sector in the same proportion as they appeared in the household row produced in IO5, i.e.,

$$HHD_j = EIs * (hhdj / \sum_k hhdk) ,$$

where, HHD_j = new household row entry for industry j

EIs = earnings in sectors as obtained from Data Worksheets

hhdj = old household row entry for industry j from IO5.

$\sum_k hhdk$ = total household income for all sectors k from IO5 ($k = s1, s2, \ldots, s11$)

Since Personal income equals Earnings plus Property Income, an estimate of the proportion of the Total Property Income generated by

all industries to be allocated to each detailed industry j was made according to the proportion of total capital residual or savings of industry j; and the final household income row is produced:

$$FHHDj = HHDj + (PIt * (Sj / \sum_{k} Sj)) ,$$

where, FHHDj = final household income row entry for industry j

PIt = total Property income from Data Worksheets.

SJ = savings (capital residual) in each detailed industry j as obtained from I05.

Thirdly, in order to complete the household row in the final demand sectors, values for payments by federal, state and local governments were put in the system. Commuting income is inserted in the household row and export column cell. Commuting income is defined as income of outcommuters (residents of the area working outside the area) minus income of incommuters (residents outside of the area working inside the area). Commuting patterns for 1970 were obtained from Commuting Patterns, 1970, and it was assumed that the ratio of net commuters (outcommuters minus incommuters) to total wage and salary employment within the region would remain constant. Hence,

Commuting Income 1972 = # of Net Commuters (1972) * Avg. wage paid (1972)

A.3.2.5 I010. This program corrects the Area Transactions and transfers matrices to reflect the corrected household row produced in I09AM. The correction scheme used was:

$$AAij = aaij * (FHHDj/hhdj),$$

where, AAij = new Area transactions from i to j

aaij = old Area transactions from i to j from IO5

FHHDj = household row entry in j^{th} column from IO9AM

hhdj = household row entry in j^{th} column from IO5.

A.3.2.6 IO10A. This program produces an area Capital Formation Column in the final demand sector as a function of the national capital formation matrix.

A.3.2.7 IO6. This program, using a simulated supply-demand pool, separates the area transactions matrix into two component matrices: the local transactions and area competitive imports matrices. Total imports to a local industry can be found in the import row of the local transaction matrix.

The Supply-Demand Pool technique as described by Schaffer (63) is as follows:

1) for each industry i = j, calculate:

$$SUPPLYi = AAij \quad \text{and} \quad DEMANDi = AAij \ ,$$

where AAij = Area transaction from i to j

2) let RATIOi = SUPPLYi/DEMANDi, then

2a) If RATIOi is greater than or equal to one, set RATIOi = 1 and let imports, LMij = 0. Set exportsi = SUPPLYi - DEMANDi.

2b) if RATIOi is less than one, compute new transactions with:

LAij = AAij * RATIOi. Imports is LMij = AAij-LAij, and exports = 0.

Thus the pool procedure allocates local production, where adequate, to meet local needs; where the local output is inadequate, it allocates

to each purchasing industry j a share of the area output i based on the needs of the purchasing industry itself relative to the total needs for output i (transaction ij = SUPPLYi * (DEMANDj/DEMANDi)).

A.3.2.8 I07. This program adds the Area transfers matrix to the local transactions matrix to form the total transactions matrix.

A.3.2.9 I08. This program is the system aggregation routine which reduces the 300-industry model to the 29-industry model.

A.3.2.10 I017M. Information gathered about the export activity of industry i, caused some changes to be made in the export vector; this program uses the Export's Only method as devised by Schaffer (65, p. 80) to make the appropriate corrections.

The method is as follows:

1) calculate BRATIOi = (SUPPLYi - EXPORTSi)/DEMANDi

Local trade is estimated as a residual according to needs:

$$LAij = DEMANDij * BRATIOi$$

If BRATIOi is greater than one, SUPPLYij will be larger than expected. As a result, value added will be reduced to account for this overestimate of interindustry purchases.

If BRATIOi is less than or equal to one, then LAij and LMij will be computed as in the supply-demand procedure.

APPENDIX B

THE 29-INDUSTRY I-O MODEL FOR THE NORTHEAST GA. AREA

TABLE 1. INTERINDUSTRY FLOW OF GOODS AND SERVICES IN N.E.GA, , 1972

(MILLIONS OF DOLLARS)

	SELLING INDUSTRY	PURCHASING INDUSTRY NUMBER (SEE LEFT FOR TITLE) 1	2	3	4	5	6	7
1	AGRICULTURE (SIC 01, 07-9)	10.655	.000	.334	94.002	1.895	.197	.534
2	MINING (SIC 10-4)	.040	.300	3.419	.089	.004	.000	.002
3	CONTRACT CONSTRUCTION (SIC 15-7)	.814	.239	.129	.503	.725	.065	.121
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	21.000	.000	.001	24.669	.000	.000	.002
5	TEXTILE MILL PRODUCTS (SIC 22)	.644	.002	.326	.201	55.158	27.637	.002
6	APPAREL AND RELATED PRODUCTS (SIC 23)	.037	.000	.235	.710	.074	17.644	.066
7	LUMBER AND WOOD PRODUCTS (SIC 24)	.095	.001	11.175	.054	.001	.004	8.309
8	FURNITURE AND FIXTURES (SIC 25)	.000	.000	.881	.001	.045	.017	.061
9	PAPER AND ALLIED PRODUCTS (SIC 26)	1.447	.095	.362	5.368	3.514	.682	.154
10	PRINTING AND PUBLISHING (SIC 27)	.000	.001	.000	.727	.001	.000	.001
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	.249	.205	1.050	.617	11.047	.025	.109
12	PETROLEUM REFINING (SIC 29)	.000	.057	2.905	.000	.000	.000	.001
13	RUBBER AND MISC. PLASTICS (SIC 30)	.075	.261	2.018	1.142	.073	.183	.123
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	.048	.000	.006	.008	.015	.335	.008
15	STONE, CLAY AND GLASS PROD. (SIC 32)	.016	1.203	16.069	.000	.305	.005	.127
16	PRIMARY METAL INDUSTRIES (SIC 33)	.003	.125	7.356	.000	.000	.001	.036
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	1.238	.100	21.672	.363	.015	.006	.390
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	.060	.267	3.378	.126	.473	.017	.085
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	.011	.086	5.128	.006	.002	.001	.003
20	TRANSPORTATION EQUIPMENT (SIC 37)	.031	.255	.232	.031	.007	.005	.008
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	.001	.000	.179	.021	.132	.346	.022
22	TRANSPORTATION SERVICES (SIC 40-7)	1.507	.255	7.940	5.782	2.562	.385	.665
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	.473	.728	1.615	1.307	2.059	.583	.283
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	3.364	.666	24.558	4.596	5.366	2.491	.510
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	.743	.407	1.229	.546	.762	.600	.160
26	SERVICES (SIC 70-9, 80-6, 89)	.875	.662	8.880	4.245	3.045	1.357	.511
27	FEDERAL GOVERNMENT ENTERPRISES	.012	.012	.078	.115	.182	.198	.016
28	STATE & LOCAL GOVERNMENT ENTERPRISES	.003	.045	.187	.069	.041	.005	.007
29	UNALLOCATED INDUSTRIES	.355	.305	2.619	.950	1.153	.758	.160
30	TOTAL LOCAL PURCHASES	43.795	6.278	123.961	146.250	88.656	53.547	12.473
31	HOUSEHOLDS	49.533	7.582	89.458	51.621	82.189	65.285	8.915
32	CAPITAL RESIDUAL	19.394	4.826	14.192	9.247	16.338	4.272	1.810
33	CITY AND COUNTY GOVERNMENT	2.157	.247	3.447	1.045	1.180	.214	.449
34	STATE GOVERNMENT	.000	.090	1.264	.893	1.254	.449	.694
35	FEDERAL GOVERNMENT	.000	1.210	13.793	8.551	11.524	5.495	1.295
36	IMPORTS	25.153	7.163	93.105	113.613	77.266	11.986	6.740
37	TOTAL PURCHASES	140.031	27.396	339.220	331.220	278.407	141.249	32.377

TABLE 1. INTERINDUSTRY FLOW OF GOODS AND SERVICES IN N.E.GA., 1972

(MILLIONS OF DOLLARS)

	SELLING INDUSTRY	PURCHASING INDUSTRY NUMBER (SEE LEFT FOR TITLE) 8	9	10	11	12	13	14
1	AGRICULTURE (SIC 01, 07-9)	.000	.000	.000	.008	.000	.000	.000
2	MINING (SIC 10-4)	.000	.250	.000	.022	.887	.022	.000
3	CONTRACT CONSTRUCTION (SIC 15-7)	.026	.134	.038	.156	.096	.182	.038
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	.000	.003	.015	.466	.000	.002	2.145
5	TEXTILE MILL PRODUCTS (SIC 22)	1.976	.124	.013	.021	.000	.058	.431
6	APPAREL AND RELATED PRODUCTS (SIC 23)	.036	.086	.000	.112	.016	.013	.196
7	LUMBER AND WOOD PRODUCTS (SIC 24)	2.178	.037	.030	.043	.036	.150	.170
8	FURNITURE AND FIXTURES (SIC 25)	.342	.001	.000	.000	.000	.005	.000
9	PAPER AND ALLIED PRODUCTS (SIC 26)	.216	2.007	.512	.663	.463	1.169	.322
10	PRINTING AND PUBLISHING (SIC 27)	.000	.172	.442	.001	.000	.001	.001
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	.058	.374	.118	2.000	.011	.793	.108
12	PETROLEUM REFINING (SIC 29)	.000	.010	.000	.340	.021	.000	.000
13	RUBBER AND MISC. PLASTICS (SIC 30)	.687	.668	.063	.791	.002	.009	.331
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	.017	.004	.002	.005	.002	.005	4.695
15	STONE, CLAY AND GLASS PROD. (SIC 32)	.049	.000	.000	.006	.073	.207	.003
16	PRIMARY METAL INDUSTRIES (SIC 33)	.051	.000	.000	.080	.008	.096	.000
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	1.874	.085	.015	.084	.004	.247	.044
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	.005	.009	.003	.023	.006	.038	.005
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	.002	.001	.002	.104	.000	.004	.000
20	TRANSPORTATION EQUIPMENT (SIC 37)	.069	.003	.003	.003	.002	.024	.001
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	.021	.016	.040	.218	.003	.222	.115
22	TRANSPORTATION SERVICES (SIC 40-7)	.288	1.039	.155	.755	.691	.540	.169
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	.152	.379	.267	.970	.273	.529	.154
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	.570	.784	.301	.806	1.265	.981	.494
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	.172	.223	.214	.194	.141	.236	.112
26	SERVICES (SIC 70-9, 80-6, 89)	.441	.868	.577	.956	.624	.928	.524
27	FEDERAL GOVERNMENT ENTERPRISES	.018	.029	.087	.020	.016	.030	.046
28	STATE & LOCAL GOVERNMENT ENTERPRISES	.002	.004	.003	.005	.009	.009	.004
29	UNALLOCATED INDUSTRIES	.176	.380	.328	.348	.212	.355	.171
30	TOTAL LOCAL PURCHASES	9.427	7.690	3.230	9.201	4.863	6.856	10.279
31	HOUSEHOLDS	5.385	8.650	9.802	10.094	5.592	12.827	9.308
32	CAPITAL RESIDUAL	.786	1.410	1.756	2.238	.806	2.998	1.818
33	CITY AND COUNTY GOVERNMENT	.051	.170	.101	.257	.123	.406	.129
34	STATE GOVERNMENT	.042	.126	.086	.117	.012	.281	.171
35	FEDERAL GOVERNMENT	.461	1.242	.801	1.434	.306	2.258	1.504
36	IMPORTS	3.616	19.912	5.579	12.952	10.136	17.911	4.172
37	TOTAL PURCHASES	19.768	39.201	21.354	36.292	21.838	43.536	27.382

TABLE 1. INTERINDUSTRY FLOW OF GOODS AND SERVICES IN N.E.GA, , 1972

(MILLIONS OF DOLLARS)

	SELLING INDUSTRY	PURCHASING INDUSTRY NUMBER (SEE LEFT FOR TITLE) 15	16	17	18	19	20	21
1	AGRICULTURE (SIC 01, 07-9)	.000	.000	.000	.000	.000	.000	.001
2	MINING (SIC 10-4)	6.235	.038	.002	.000	.000	.003	.001
3	CONTRACT CONSTRUCTION (SIC 15-7)	.228	.148	.125	.067	.162	.144	.085
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	.000	.000	.000	.060	.000	.000	.082
5	TEXTILE MILL PRODUCTS (SIC 22)	.002	.145	.238	.017	.446	.319	.332
6	APPAREL AND RELATED PRODUCTS (SIC 23)	.086	.033	.051	.034	.126	.593	.082
7	LUMBER AND WOOD PRODUCTS (SIC 24)	.350	.355	.256	.596	.188	3.305	.443
8	FURNITURE AND FIXTURES (SIC 25)	.030	.000	.073	.002	.001	1.358	.057
9	PAPER AND ALLIED PRODUCTS (SIC 26)	.158	.341	.817	.291	2.030	.022	.532
10	PRINTING AND PUBLISHING (SIC 27)	.000	.000	.001	.001	.005	.000	.028
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	.443	.098	.161	.100	.266	.127	.086
12	PETROLEUM REFINING (SIC 29)	.016	.000	.019	.000	.000	.044	.001
13	RUBBER AND MISC. PLASTICS (SIC 30)	.244	.036	.184	.566	1.716	1.562	.908
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	.009	.005	.006	.039	.007	.002	.477
15	STONE, CLAY AND GLASS PROD. (SIC 32)	.718	.012	.655	.012	1.809	.699	.159
16	PRIMARY METAL INDUSTRIES (SIC 33)	.145	4.720	3.291	.959	7.675	1.379	.267
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	.396	.375	1.717	1.146	1.584	3.895	.327
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	.065	.206	.396	4.760	.508	1.441	.067
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	.007	.005	.150	1.480	3.954	.416	.267
20	TRANSPORTATION EQUIPMENT (SIC 37)	.029	.199	.426	.528	.130	19.188	.219
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	.023	.024	.089	.299	1.264	.867	7.591
22	TRANSPORTATION SERVICES (SIC 40-7)	2.093	.822	.779	.284	1.192	1.121	.276
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	.884	.611	.617	.328	.994	.353	.431
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	1.088	.988	1.340	.852	3.258	1.433	1.877
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	.231	.183	.438	.301	.693	.214	.220
26	SERVICES (SIC 70-9, 80-6, 89)	1.504	.642	1.126	.769	2.564	1.633	2.315
27	FEDERAL GOVERNMENT ENTERPRISES	.047	.025	.049	.043	.091	.058	.067
28	STATE & LOCAL GOVERNMENT ENTERPRISES	.031	.011	.007	.005	.017	.008	.009
29	UNALLOCATED INDUSTRIES	.762	.595	.716	.491	1.529	.799	.619
30	TOTAL LOCAL PURCHASES	15.823	10.616	13.729	14.031	32.209	40.985	17.829
31	HOUSEHOLDS	18.628	15.028	18.915	14.536	41.775	25.017	13.764
32	CAPITAL RESIDUAL	2.637	3.188	4.458	3.957	7.497	14.500	2.797
33	CITY AND COUNTY GOVERNMENT	.381	.404	.527	.252	.883	.389	.266
34	STATE GOVERNMENT	.129	.386	.419	.196	.440	.969	.186
35	FEDERAL GOVERNMENT	1.518	2.310	3.368	2.249	5.496	13.452	2.076
36	IMPORTS	12.180	25.290	25.565	14.025	38.999	24.458	10.880
37	TOTAL PURCHASES	51.296	57.221	66.981	49.247	127.300	119.769	47.798

TABLE 1. INTERINDUSTRY FLOW OF GOODS AND SERVICES IN N.E.GA., 1972

(MILLIONS OF DOLLARS)

	SELLING INDUSTRY	PURCHASING INDUSTRY NUMBER (SEE LEFT FOR TITLE) 22	23	24	25	26	27	28
1	AGRICULTURE (SIC 01, 07-9)	.013	.000	.206	4.190	.030	.000	.004
2	MINING (SIC 10-4)	.000	.001	.056	.196	.011	.000	.000
3	CONTRACT CONSTRUCTION (SIC 15-7)	2.495	3.659	1.121	7.306	8.058	.042	5.849
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	.017	.002	2.277	.261	.548	.000	.000
5	TEXTILE MILL PRODUCTS (SIC 22)	.002	.030	.526	.418	.080	.012	.000
6	APPAREL AND RELATED PRODUCTS (SIC 23)	.021	.028	.622	.269	.193	.009	.006
7	LUMBER AND WOOD PRODUCTS (SIC 24)	.004	.006	.306	.080	.000	.000	.000
8	FURNITURE AND FIXTURES (SIC 25)	.000	.000	.117	.022	.000	.000	.000
9	PAPER AND ALLIED PRODUCTS (SIC 26)	.016	.008	2.647	.072	.321	.000	.000
10	PRINTING AND PUBLISHING (SIC 27)	.048	.000	.262	.270	10.978	.018	.000
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	.015	.015	.244	.449	.708	.000	.056
12	PETROLEUM REFINING (SIC 29)	.000	.000	.432	.046	.000	.000	.000
13	RUBBER AND MISC. PLASTICS (SIC 30)	.252	.028	.679	.152	.716	.007	.011
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	.000	.001	.094	.039	.032	.001	.000
15	STONE, CLAY AND GLASS PROD. (SIC 32)	.005	.026	.672	.155	.245	.000	.000
16	PRIMARY METAL INDUSTRIES (SIC 33)	.071	.033	.104	.036	.011	.000	.000
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	.075	.000	.860	.138	.533	.001	.000
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	.033	.003	.472	.418	.971	.000	.004
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	.083	.013	.719	.508	.519	.001	.001
20	TRANSPORTATION EQUIPMENT (SIC 37)	.144	.013	.323	.151	2.074	.016	.013
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	.000	.000	.523	.064	.988	.000	.000
22	TRANSPORTATION SERVICES (SIC 40-7)	2.552	1.251	.826	.509	1.387	.740	.053
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	.537	9.842	4.914	1.795	15.878	.048	.778
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	.952	.570	2.734	3.214	7.755	.054	.076
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	.575	.574	5.991	13.263	10.528	.075	.121
26	SERVICES (SIC 70-9, 80-6, 89)	1.645	3.468	11.287	7.676	16.092	.151	.806
27	FEDERAL GOVERNMENT ENTERPRISES	.061	.226	1.240	.790	2.558	.001	.007
28	STATE & LOCAL GOVERNMENT ENTERPRISES	1.503	.996	1.996	3.356	1.005	.004	.008
29	UNALLOCATED INDUSTRIES	.299	.792	2.356	1.099	8.471	.106	.078
30	TOTAL LOCAL PURCHASES	11.420	21.584	44.608	46.942	90.689	1.287	7.872
31	HOUSEHOLDS	26.310	31.783	160.056	59.195	130.601	6.085	3.166
32	CAPITAL RESIDUAL	3.344	24.708	26.410	33.158	49.274	.000	8.840
33	CITY AND COUNTY GOVERNMENT	.304	3.800	3.690	2.806	8.911	.000	.000
34	STATE GOVERNMENT	.414	.787	40.271	2.927	3.976	.000	.000
35	FEDERAL GOVERNMENT	1.757	11.332	19.855	2.262	21.334	.000	.000
36	IMPORTS	6.421	13.889	25.617	25.813	55.270	.903	1.704
37	TOTAL PURCHASES	49.969	107.884	320.507	173.103	360.056	8.275	21.581

TABLE 1. INTERINDUSTRY FLOW OF GOODS AND SERVICES IN N.E.GA., 1972

(MILLIONS OF DOLLARS)

	SELLING INDUSTRY	PURCHASING INDUSTRY NUMBER (SEE LEFT FOR TITLE) 29
1	AGRICULTURE (SIC 01, 07-9)	.141
2	MINING (SIC 10-4)	.000
3	CONTRACT CONSTRUCTION (SIC 15-7)	.000
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	2.686
5	TEXTILE MILL PRODUCTS (SIC 22)	.134
6	APPAREL AND RELATED PRODUCTS (SIC 23)	.029
7	LUMBER AND WOOD PRODUCTS (SIC 24)	.010
8	FURNITURE AND FIXTURES (SIC 25)	.000
9	PAPER AND ALLIED PRODUCTS (SIC 26)	1.123
10	PRINTING AND PUBLISHING (SIC 27)	2.387
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	.010
12	PETROLEUM REFINING (SIC 29)	.000
13	RUBBER AND MISC. PLASTICS (SIC 30)	.015
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	.100
15	STONE, CLAY AND GLASS PROD. (SIC 32)	.012
16	PRIMARY METAL INDUSTRIES (SIC 33)	.086
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	.092
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	.118
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	.103
20	TRANSPORTATION EQUIPMENT (SIC 37)	.252
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	.476
22	TRANSPORTATION SERVICES (SIC 40-7)	1.900
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	.000
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	1.414
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	.000
26	SERVICES (SIC 70-9, 80-6, 89)	4.013
27	FEDERAL GOVERNMENT ENTERPRISES	.000
28	STATE & LOCAL GOVERNMENT ENTERPRISES	.000
29	UNALLOCATED INDUSTRIES	.000
30	TOTAL LOCAL PURCHASES	15.102
31	HOUSEHOLDS	.000
32	CAPITAL RESIDUAL	.000
33	CITY AND COUNTY GOVERNMENT	.000
34	STATE GOVERNMENT	.000
35	FEDERAL GOVERNMENT	.000
36	IMPORTS	14.404
37	TOTAL PURCHASES	29.506

TABLE 1. INTERINDUSTRY FLOW OF GOODS AND SERVICES IN N.E.GA., 1972

(MILLIONS OF DOLLARS)

		TOTAL LOCAL SALES	FINAL DEMAND: PERSONAL CONSUMPTION EXPENDITURES	GROSS PRIVATE INVESTMENT	LOCAL GOVERNMENT	STATE GOVERNMENT	FEDERAL GOVERNMENT (DEFENSE)	FEDERAL GOVERNMENT (OTHER)
1	AGRICULTURE (SIC 01, 07-9)	112.211	6.062	.000	.045	.034	.000	.126
2	MINING (SIC 10-4)	11.580	.040	.000	.000	.000	.000	.000
3	CONTRACT CONSTRUCTION (SIC 15-7)	32.757	.000	95.597	35.113	32.705	.000	1.490
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	54.236	80.259	.000	.835	.658	.000	.018
5	TEXTILE MILL PRODUCTS (SIC 22)	89.294	5.730	.116	.037	.033	.000	.001
6	APPAREL AND RELATED PRODUCTS (SIC 23)	21.405	38.204	.000	.216	.205	.000	.012
7	LUMBER AND WOOD PRODUCTS (SIC 24)	28.179	.648	.020	.011	.009	.000	.001
8	FURNITURE AND FIXTURES (SIC 25)	3.014	7.921	.632	.053	.028	.000	.003
9	PAPER AND ALLIED PRODUCTS (SIC 26)	25.352	1.576	.000	.173	.139	.000	.001
10	PRINTING AND PUBLISHING (SIC 27)	15.546	3.368	.000	.186	.140	.000	.000
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	19.540	1.512	.000	.236	.233	.000	.011
12	PETROLEUM REFINING (SIC 29)	3.894	.000	.000	.000	.000	.000	.000
13	RUBBER AND MISC. PLASTICS (SIC 30)	13.504	3.653	.000	.132	.107	.000	.002
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	5.965	9.365	.000	.000	.000	.000	.000
15	STONE, CLAY AND GLASS PROD. (SIC 32)	23.244	.779	.000	.085	.057	.000	.000
16	PRIMARY METAL INDUSTRIES (SIC 33)	26.534	.017	.123	.002	.001	.000	.001
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	37.274	1.053	.499	.051	.024	.000	.003
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	13.956	.866	12.988	.453	.226	.000	.010
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	13.577	1.167	4.594	.309	.259	.000	.014
20	TRANSPORTATION EQUIPMENT (SIC 37)	24.377	52.405	11.415	1.328	.808	.000	.106
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	13.548	2.448	1.355	.393	.302	.000	.012
22	TRANSPORTATION SERVICES (SIC 40-7)	38.518	10.429	.000	.603	.390	.000	.029
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	47.784	30.876	.000	2.381	1.466	.000	.017
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	74.357	226.717	.000	.778	.538	.000	.035
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	39.145	119.398	.000	1.111	.692	.000	.996
26	SERVICES (SIC 70-9, 80-6, 89)	80.186	166.023	.000	4.411	3.830	.000	.540
27	FEDERAL GOVERNMENT ENTERPRISES	6.124	1.705	.000	.235	.204	.000	.007
28	STATE & LOCAL GOVERNMENT ENTERPRISES	9.548	2.003	.000	.072	.041	.000	.095
29	UNALLOCATED INDUSTRIES	26.981	.000	.000	1.049	.793	.000	.079
30	TOTAL LOCAL PURCHASES	911.231	774.225	127.341	50.298	43.922	.000	3.611
31	HOUSEHOLDS	981.102	9.568	.000	95.253	63.868	.000	160.280
32	CAPITAL RESIDUAL	266.659	83.652	.000	.000	.000	.000	.000
33	CITY AND COUNTY GOVERNMENT	32.588	36.270	.000	.000	44.323	.000	1.229
34	STATE GOVERNMENT	56.581	32.815	.000	2.413	.000	.000	10.622
35	FEDERAL GOVERNMENT	136.884	210.946	.000	.000	1.896	.000	.000
36	IMPORTS	704.720	375.321	39.495	15.137	10.556	.000	5.586
37	TOTAL PURCHASES	3089.766	1522.798	166.836	163.102	164.565	.000	181.327

TABLE 1. INTERINDUSTRY FLOW OF GOODS AND SERVICES IN N.E.GA, , 1972

(MILLIONS OF DOLLARS)

		FINAL DEMAND		
		NET EXPORTS	TOTAL FINAL DEMAND	TOTAL SALES
1	AGRICULTURE (SIC 01, 07-9)	21.552	27.820	140.031
2	MINING (SIC 10-4)	15.776	15.816	27.396
3	CONTRACT CONSTRUCTION (SIC 15-7)	141.558	306.462	339.220
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	195.213	276.984	331.220
5	TEXTILE MILL PRODUCTS (SIC 22)	183.196	189.113	278.407
6	APPAREL AND RELATED PRODUCTS (SIC 23)	81.207	119.844	141.249
7	LUMBER AND WOOD PRODUCTS (SIC 24)	3.509	4.198	32.377
8	FURNITURE AND FIXTURES (SIC 25)	8.118	16.755	19.768
9	PAPER AND ALLIED PRODUCTS (SIC 26)	11.959	13.849	39.201
10	PRINTING AND PUBLISHING (SIC 27)	2.313	6.008	21.354
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	14.760	16.752	36.292
12	PETROLEUM REFINING (SIC 29)	17.944	17.944	21.838
13	RUBBER AND MISC. PLASTICS (SIC 30)	26.138	30.032	43.536
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	12.051	21.417	27.382
15	STONE, CLAY AND GLASS PROD. (SIC 32)	27.130	28.052	51.296
16	PRIMARY METAL INDUSTRIES (SIC 33)	30.543	30.687	57.221
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	28.077	29.707	66.981
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	20.747	35.290	49.247
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	107.380	113.724	127.300
20	TRANSPORTATION EQUIPMENT (SIC 37)	29.330	95.393	119.769
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	29.740	34.250	47.798
22	TRANSPORTATION SERVICES (SIC 40-7)	.000	11.451	49.969
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	25.360	60.100	107.884
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	18.081	246.150	320.507
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	11.760	133.957	173.103
26	SERVICES (SIC 70-9, 80-6, 89)	105.067	279.871	360.056
27	FEDERAL GOVERNMENT ENTERPRISES	.000	2.151	8.275
28	STATE & LOCAL GOVERNMENT ENTERPRISES	10.022	12.233	21.581
29	UNALLOCATED INDUSTRIES	.604	2.524	29.506
30	TOTAL LOCAL PURCHASES	1179.137	2178.535	3089.766
31	HOUSEHOLDS	212.798	541.767	1522.869
32	CAPITAL RESIDUAL	.000	83.652	350.311
33	CITY AND COUNTY GOVERNMENT	.000	81.822	114.411
34	STATE GOVERNMENT	.000	45.850	102.432
35	FEDERAL GOVERNMENT	.000	212.841	349.725
36	IMPORTS	-1150.816	-704.720	.000
37	TOTAL PURCHASES	241.119	2439.748	5529.514

TABLE 2. DIRECT REQUIREMENTS PER DOLLAR OF GROSS OUTPUT, N.E.GA., , 1972

(IN PERCENT)

	SELLING INDUSTRY	PURCHASING INDUSTRY NUMBER (SEE LEFT FOR TITLE) 1	2	3	4	5	6	7
1	AGRICULTURE (SIC 01, 07-9)	7.61	.00	.10	28.38	.68	.14	1.65
2	MINING (SIC 10-4)	.03	1.09	1.01	.03	.00	.00	.01
3	CONTRACT CONSTRUCTION (SIC 15-7)	.58	.87	.04	.15	.26	.05	.37
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	15.00	.00	.00	7.45	.00	.00	.00
5	TEXTILE MILL PRODUCTS (SIC 22)	.46	.01	.10	.06	19.81	19.57	.01
6	APPAREL AND RELATED PRODUCTS (SIC 23)	.03	.00	.07	.21	.03	12.49	.21
7	LUMBER AND WOOD PRODUCTS (SIC 24)	.07	.00	3.29	.02	.00	.00	25.66
8	FURNITURE AND FIXTURES (SIC 25)	.00	.00	.26	.00	.02	.01	.19
9	PAPER AND ALLIED PRODUCTS (SIC 26)	1.03	.35	.11	1.62	1.26	.48	.47
10	PRINTING AND PUBLISHING (SIC 27)	.00	.00	.00	.22	.00	.00	.00
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	.19	.75	.31	.19	3.97	.02	.34
12	PETROLEUM REFINING (SIC 29)	.00	.21	.86	.00	.00	.00	.00
13	RUBBER AND MISC. PLASTICS (SIC 30)	.05	.95	.59	.34	.03	.13	.38
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	.03	.00	.00	.00	.01	.24	.02
15	STONE, CLAY AND GLASS PROD. (SIC 32)	.01	4.39	4.74	.00	.11	.00	.39
16	PRIMARY METAL INDUSTRIES (SIC 33)	.00	.46	2.17	.00	.00	.00	.11
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	.88	.37	6.39	.11	.01	.00	1.20
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	.04	.98	1.00	.04	.17	.01	.26
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	.01	.31	1.51	.00	.00	.00	.01
20	TRANSPORTATION EQUIPMENT (SIC 37)	.02	.93	.07	.01	.00	.00	.03
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	.00	.00	.05	.01	.05	.24	.07
22	TRANSPORTATION SERVICES (SIC 40-7)	1.00	.93	2.34	1.75	.92	.27	2.05
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	.34	2.66	.48	.39	.74	.41	.87
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	2.40	2.43	7.24	1.39	1.93	1.76	1.58
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	.53	1.49	.36	.16	.27	.42	.49
26	SERVICES (SIC 70-9, 80-6, 89)	.63	2.42	2.62	1.28	1.09	.96	1.58
27	FEDERAL GOVERNMENT ENTERPRISES	.01	.05	.02	.03	.07	.14	.05
28	STATE & LOCAL GOVERNMENT ENTERPRISES	.00	.17	.06	.02	.01	.00	.02
29	UNALLOCATED INDUSTRIES	.25	1.11	.77	.29	.41	.54	.49
30	TOTAL LOCAL PURCHASES	31.28	22.92	36.54	44.15	31.84	37.91	38.53
31	HOUSEHOLDS	35.37	27.68	26.37	15.59	29.52	46.22	27.54
32	CAPITAL RESIDUAL	13.85	17.61	4.18	2.79	5.87	3.02	5.59
33	CITY AND COUNTY GOVERNMENT	1.54	.90	1.02	.32	.42	.15	1.39
34	STATE GOVERNMENT	.00	.33	.37	.27	.45	.32	2.14
35	FEDERAL GOVERNMENT	.00	4.42	4.07	2.58	4.14	3.89	4.00
36	IMPORTS	17.96	26.14	27.45	34.30	27.75	8.49	20.82
37	TOTAL PURCHASES	100.00	100.00	100.00	100.00	100.00	100.00	100.00

TABLE 2. DIRECT REQUIREMENTS PER DOLLAR OF GROSS OUTPUT, N.E.GA., 1972

(IN PERCENT)

	SELLING INDUSTRY	PURCHASING INDUSTRY NUMBER (SEE LEFT FOR TITLE) 8	9	10	11	12	13	14
1	AGRICULTURE (SIC 01, 07-9)	.00	.00	.00	.02	.00	.00	.00
2	MINING (SIC 10-4)	.00	.64	.00	.06	4.06	.05	.00
3	CONTRACT CONSTRUCTION (SIC 15-7)	.13	.34	.18	.43	.44	.42	.14
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	.00	.01	.07	1.28	.00	.00	7.83
5	TEXTILE MILL PRODUCTS (SIC 22)	10.00	.32	.06	.06	.00	.13	1.58
6	APPAREL AND RELATED PRODUCTS (SIC 23)	.18	.22	.00	.31	.07	.03	.72
7	LUMBER AND WOOD PRODUCTS (SIC 24)	11.02	.09	.14	.12	.16	.35	.62
8	FURNITURE AND FIXTURES (SIC 25)	1.73	.00	.00	.00	.00	.01	.00
9	PAPER AND ALLIED PRODUCTS (SIC 26)	1.10	5.12	2.40	1.83	2.12	2.69	1.17
10	PRINTING AND PUBLISHING (SIC 27)	.00	.44	2.07	.00	.00	.00	.00
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	.29	.95	.55	5.51	.05	1.82	.39
12	PETROLEUM REFINING (SIC 29)	.00	.03	.00	.94	.10	.00	.00
13	RUBBER AND MISC. PLASTICS (SIC 30)	3.48	1.70	.30	2.18	.01	.02	1.21
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	.09	.01	.01	.01	.01	.01	17.15
15	STONE, CLAY AND GLASS PROD. (SIC 32)	.25	.00	.00	.02	.34	.48	.01
16	PRIMARY METAL INDUSTRIES (SIC 33)	.26	.00	.00	.22	.04	.22	.00
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	9.48	.22	.07	.23	.02	.57	.16
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	.03	.02	.01	.06	.03	.09	.02
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	.01	.00	.01	.29	.00	.01	.00
20	TRANSPORTATION EQUIPMENT (SIC 37)	.35	.01	.01	.01	.01	.06	.00
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	.11	.04	.19	.60	.02	.51	.42
22	TRANSPORTATION SERVICES (SIC 40-7)	1.46	2.65	.73	2.08	3.17	1.24	.62
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	.77	.97	1.25	2.67	1.25	1.22	.56
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	2.89	2.00	1.41	2.22	5.79	2.25	1.81
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	.87	.57	1.00	.54	.65	.54	.41
26	SERVICES (SIC 70-9, 80-6, 89)	2.23	2.22	2.70	2.63	2.86	2.13	1.92
27	FEDERAL GOVERNMENT ENTERPRISES	.09	.07	.41	.06	.08	.07	.17
28	STATE & LOCAL GOVERNMENT ENTERPRISES	.01	.01	.01	.01	.04	.02	.02
29	UNALLOCATED INDUSTRIES	.89	.97	1.54	.96	.97	.82	.62
30	TOTAL LOCAL PURCHASES	47.69	19.62	15.12	25.35	22.27	15.75	37.54
31	HOUSEHOLDS	27.24	22.07	45.90	27.81	25.61	29.46	33.99
32	CAPITAL RESIDUAL	3.98	3.60	8.22	6.17	3.69	6.89	6.64
33	CITY AND COUNTY GOVERNMENT	.26	.43	.47	.71	.56	.93	.47
34	STATE GOVERNMENT	.21	.32	.40	.32	.05	.65	.63
35	FEDERAL GOVERNMENT	2.33	3.17	3.75	3.95	1.40	5.19	5.49
36	IMPORTS	18.29	50.79	26.13	35.69	46.41	41.14	15.23
37	TOTAL PURCHASES	100.00	100.00	100.00	100.00	100.00	100.00	100.00

TABLE 2. DIRECT REQUIREMENTS PER DOLLAR OF GROSS OUTPUT, N.E.GA., 1972

(IN PERCENT)

	SELLING INDUSTRY	PURCHASING INDUSTRY NUMBER (SEE LEFT FOR TITLE) 15	16	17	18	19	20	21
1	AGRICULTURE (SIC 01, 07-9)	.00	.00	.00	.00	.00	.00	.00
2	MINING (SIC 10-4)	12.16	.07	.00	.00	.00	.00	.00
3	CONTRACT CONSTRUCTION (SIC 15-7)	.44	.26	.19	.14	.13	.12	.18
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	.00	.00	.00	.12	.00	.00	.17
5	TEXTILE MILL PRODUCTS (SIC 22)	.00	.25	.36	.04	.35	.27	.69
6	APPAREL AND RELATED PRODUCTS (SIC 23)	.17	.06	.08	.07	.10	.49	.17
7	LUMBER AND WOOD PRODUCTS (SIC 24)	.68	.62	.38	1.21	.15	2.76	.93
8	FURNITURE AND FIXTURES (SIC 25)	.06	.00	.11	.00	.00	1.13	.12
9	PAPER AND ALLIED PRODUCTS (SIC 26)	.31	.60	1.22	.59	1.59	.02	1.11
10	PRINTING AND PUBLISHING (SIC 27)	.00	.00	.00	.00	.00	.00	.06
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	.86	.17	.24	.20	.21	.11	.18
12	PETROLEUM REFINING (SIC 29)	.03	.00	.03	.00	.00	.04	.00
13	RUBBER AND MISC. PLASTICS (SIC 30)	.47	.06	.27	1.15	1.35	1.30	1.90
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	.02	.01	.01	.08	.01	.00	1.00
15	STONE, CLAY AND GLASS PROD. (SIC 32)	1.40	.02	.98	.02	1.42	.58	.33
16	PRIMARY METAL INDUSTRIES (SIC 33)	.28	8.25	4.91	1.95	6.03	1.15	.56
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	.77	.66	2.56	2.33	1.24	3.25	.68
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	.13	.36	.59	9.67	.40	1.20	.14
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	.01	.01	.22	3.01	3.11	.35	.56
20	TRANSPORTATION EQUIPMENT (SIC 37)	.06	.35	.64	1.07	.10	16.02	.46
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	.05	.04	.13	.61	.99	.72	15.88
22	TRANSPORTATION SERVICES (SIC 40-7)	4.08	1.44	1.16	.58	.94	.94	.58
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	1.72	1.07	.92	.67	.78	.29	.90
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	2.12	1.73	2.00	1.73	2.56	1.20	3.93
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	.45	.32	.65	.61	.54	.18	.46
26	SERVICES (SIC 70-9, 80-6, 89)	2.93	1.12	1.68	1.56	2.01	1.36	4.84
27	FEDERAL GOVERNMENT ENTERPRISES	.09	.04	.07	.09	.07	.05	.14
28	STATE & LOCAL GOVERNMENT ENTERPRISES	.06	.02	.01	.01	.01	.01	.02
29	UNALLOCATED INDUSTRIES	1.49	1.04	1.07	1.00	1.20	.67	1.30
30	TOTAL LOCAL PURCHASES	30.85	18.55	20.50	28.49	25.30	34.22	37.30
31	HOUSEHOLDS	36.32	26.26	28.24	29.52	32.82	20.89	28.80
32	CAPITAL RESIDUAL	5.14	5.57	6.65	8.03	5.89	12.11	5.85
33	CITY AND COUNTY GOVERNMENT	.74	.71	.79	.51	.69	.32	.56
34	STATE GOVERNMENT	.25	.68	.63	.40	.35	.81	.39
35	FEDERAL GOVERNMENT	2.96	4.04	5.03	4.57	4.32	11.23	4.34
36	IMPORTS	23.74	44.20	38.17	28.48	30.64	20.42	22.76
37	TOTAL PURCHASES	100.00	100.00	100.00	100.00	100.00	100.00	100.00

TABLE 2. DIRECT REQUIREMENTS PER DOLLAR OF GROSS OUTPUT, N.E.GA. , 1972

(IN PERCENT)

	SELLING INDUSTRY	PURCHASING INDUSTRY NUMBER (SEE LEFT FOR TITLE)						
		22	23	24	25	26	27	28
1	AGRICULTURE (SIC 01, 07-9)	.03	.00	.06	2.42	.01	.00	.02
2	MINING (SIC 10-4)	.00	.00	.02	.11	.00	.00	.00
3	CONTRACT CONSTRUCTION (SIC 15-7)	4.99	3.39	.35	4.22	2.24	.51	27.10
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	.04	.00	.71	.15	.15	.00	.00
5	TEXTILE MILL PRODUCTS (SIC 22)	.00	.03	.16	.24	.02	.15	.00
6	APPAREL AND RELATED PRODUCTS (SIC 23)	.04	.03	.19	.16	.05	.11	.03
7	LUMBER AND WOOD PRODUCTS (SIC 24)	.01	.01	.10	.05	.00	.00	.00
8	FURNITURE AND FIXTURES (SIC 25)	.00	.00	.04	.01	.00	.00	.00
9	PAPER AND ALLIED PRODUCTS (SIC 26)	.03	.01	.83	.04	.09	.00	.00
10	PRINTING AND PUBLISHING (SIC 27)	.10	.00	.08	.16	3.05	.21	.00
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	.03	.01	.08	.26	.20	.00	.26
12	PETROLEUM REFINING (SIC 29)	.00	.00	.13	.03	.00	.00	.00
13	RUBBER AND MISC. PLASTICS (SIC 30)	.51	.03	.21	.09	.20	.09	.05
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	.00	.00	.03	.02	.01	.01	.00
15	STONE, CLAY AND GLASS PROD. (SIC 32)	.01	.02	.21	.09	.07	.00	.00
16	PRIMARY METAL INDUSTRIES (SIC 33)	.14	.03	.03	.02	.00	.00	.00
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	.15	.00	.27	.08	.15	.02	.00
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	.07	.00	.15	.24	.27	.00	.02
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	.17	.01	.22	.29	.14	.01	.01
20	TRANSPORTATION EQUIPMENT (SIC 37)	.29	.01	.10	.09	.58	.20	.06
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	.00	.00	.16	.04	.27	.01	.00
22	TRANSPORTATION SERVICES (SIC 40-7)	5.11	1.16	.26	.29	.39	8.94	.25
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	1.07	9.12	1.53	1.04	4.41	.59	3.60
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	1.90	.53	.85	1.86	2.15	.65	.35
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	1.15	.53	1.87	7.66	2.92	.91	.56
26	SERVICES (SIC 70-9, 80-6, 89)	3.29	3.21	3.52	4.43	4.47	1.83	3.73
27	FEDERAL GOVERNMENT ENTERPRISES	.12	.21	.39	.46	.71	.01	.03
28	STATE & LOCAL GOVERNMENT ENTERPRISES	3.01	.92	.62	1.94	.28	.05	.04
29	UNALLOCATED INDUSTRIES	.60	.73	.73	.63	2.35	1.28	.36
30	TOTAL LOCAL PURCHASES	22.85	20.01	13.92	27.12	25.19	15.55	36.47
31	HOUSEHOLDS	52.65	29.46	49.94	34.20	36.27	73.53	14.67
32	CAPITAL RESIDUAL	6.69	22.90	8.24	19.16	13.69	.00	40.96
33	CITY AND COUNTY GOVERNMENT	.61	3.52	1.15	1.62	2.47	.00	.00
34	STATE GOVERNMENT	.83	.73	12.56	1.69	1.10	.00	.00
35	FEDERAL GOVERNMENT	3.52	10.50	6.19	1.31	5.93	.00	.00
36	IMPORTS	12.85	12.87	7.99	14.91	15.35	10.92	7.90
37	TOTAL PURCHASES	100.00	100.00	100.00	100.00	100.00	100.00	100.00

TABLE 2. DIRECT REQUIREMENTS PER DOLLAR OF GROSS OUTPUT, N.E.G.A. , 1972

(IN PERCENT)

	SELLING INDUSTRY	PURCHASING INDUSTRY NUMBER (SEE LEFT FOR TITLE) 29
1	AGRICULTURE (SIC 01, 07-9)	.48
2	MINING (SIC 10-4)	.00
3	CONTRACT CONSTRUCTION (SIC 15-7)	.00
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	9.10
5	TEXTILE MILL PRODUCTS (SIC 22)	.46
6	APPAREL AND RELATED PRODUCTS (SIC 23)	.10
7	LUMBER AND WOOD PRODUCTS (SIC 24)	.03
8	FURNITURE AND FIXTURES (SIC 25)	.00
9	PAPER AND ALLIED PRODUCTS (SIC 26)	3.81
10	PRINTING AND PUBLISHING (SIC 27)	8.09
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	.03
12	PETROLEUM REFINING (SIC 29)	.00
13	RUBBER AND MISC. PLASTICS (SIC 30)	.05
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	.34
15	STONE, CLAY AND GLASS PROD. (SIC 32)	.04
16	PRIMARY METAL INDUSTRIES (SIC 33)	.29
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	.31
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	.40
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	.35
20	TRANSPORTATION EQUIPMENT (SIC 37)	.86
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	1.61
22	TRANSPORTATION SERVICES (SIC 40-7)	6.44
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	.00
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	4.79
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	.00
26	SERVICES (SIC 70-9, 80-6, 89)	13.60
27	FEDERAL GOVERNMENT ENTERPRISES	.00
28	STATE & LOCAL GOVERNMENT ENTERPRISES	.00
29	UNALLOCATED INDUSTRIES	.00
30	TOTAL LOCAL PURCHASES	51.18
31	HOUSEHOLDS	.00
32	CAPITAL RESIDUAL	.00
33	CITY AND COUNTY GOVERNMENT	.00
34	STATE GOVERNMENT	.00
35	FEDERAL GOVERNMENT	.00
36	IMPORTS	48.82
37	TOTAL PURCHASES	100.00

TABLE 2. DIRECT REQUIREMENTS PER DOLLAR OF GROSS OUTPUT, N.E.GA. , 1972

(IN PERCENT)

		FINAL DEMAND					
	TOTAL LOCAL SALES	PERSONAL CONSUMPTION EXPENDITURES	GROSS PRIVATE INVESTMENT	LOCAL GOVERNMENT	STATE GOVERNMENT	--FEDERAL GOVERNMENT-- (DEFENSE)	(OTHER)
1 AGRICULTURE (SIC 01, 07-9)	3.63	.40	.00	.03	.02	.00	.07
2 MINING (SIC 10-4)	.37	.00	.00	.00	.00	.00	.00
3 CONTRACT CONSTRUCTION (SIC 15-7)	1.06	.00	57.30	21.53	19.87	.00	.82
4 FOOD AND KINDRED PRODUCTS (SIC 20-1)	1.76	5.27	.00	.51	.40	.00	.01
5 TEXTILE MILL PRODUCTS (SIC 22)	2.89	.38	.07	.02	.02	.00	.00
6 APPAREL AND RELATED PRODUCTS (SIC 23)	.69	2.51	.00	.13	.12	.00	.01
7 LUMBER AND WOOD PRODUCTS (SIC 24)	.91	.04	.01	.01	.01	.00	.00
8 FURNITURE AND FIXTURES (SIC 25)	.10	.52	.38	.03	.02	.00	.00
9 PAPER AND ALLIED PRODUCTS (SIC 26)	.82	.10	.00	.11	.08	.00	.00
10 PRINTING AND PUBLISHING (SIC 27)	.50	.22	.00	.11	.09	.00	.00
11 CHEMICALS AND ALLIED PRODUCTS (SIC 28)	.63	.10	.00	.14	.14	.00	.01
12 PETROLEUM REFINING (SIC 29)	.13	.00	.00	.00	.00	.00	.00
13 RUBBER AND MISC. PLASTICS (SIC 30)	.44	.24	.00	.08	.07	.00	.00
14 LEATHER AND LEATHER PRODUCTS (SIC 31)	.19	.61	.00	.00	.00	.00	.00
15 STONE, CLAY AND GLASS PROD. (SIC 32)	.75	.05	.00	.05	.03	.00	.00
16 PRIMARY METAL INDUSTRIES (SIC 33)	.86	.00	.07	.00	.00	.00	.00
17 FABRICATED METAL PRODUCTS (SIC 34, 19)	1.21	.07	.30	.03	.01	.00	.00
18 MACHINERY, EXCEPT ELECTRICAL (SIC 35)	.45	.06	7.79	.28	.14	.00	.01
19 ELECTRICAL MACHINERY & EQUIP (SIC 36)	.44	.08	2.75	.19	.16	.00	.01
20 TRANSPORTATION EQUIPMENT (SIC 37)	.79	3.44	6.84	.81	.49	.00	.06
21 MISCELLANEOUS MANUFACTURING (SIC 38-9)	.44	.16	.81	.24	.18	.00	.01
22 TRANSPORTATION SERVICES (SIC 40-7)	1.25	.68	.00	.37	.24	.00	.02
23 COMMUNICATIONS & UTILITIES (SIC 48-9)	1.55	2.03	.00	1.46	.89	.00	.01
24 WHOLESALE AND RETAIL TRADE (SIC 50-9)	2.41	14.89	.00	.48	.33	.00	.02
25 FINANCE, INS., REAL ESTATE (SIC 60-7)	1.27	7.84	.00	.68	.42	.00	.55
26 SERVICES (SIC 70-9, 80-6, 89)	2.60	10.90	.00	2.70	2.33	.00	.30
27 FEDERAL GOVERNMENT ENTERPRISES	.20	.11	.00	.14	.12	.00	.00
28 STATE & LOCAL GOVERNMENT ENTERPRISES	.30	.13	.00	.04	.02	.00	.05
29 UNALLOCATED INDUSTRIES	.87	.00	.00	.64	.48	.00	.04
30 TOTAL LOCAL PURCHASES	29.49	50.84	76.33	30.84	26.69	.00	1.99
31 HOUSEHOLDS	31.75	.63	.00	58.40	58.81	.00	88.39
32 CAPITAL RESIDUAL	8.63	5.49	.00	.00	.00	.00	.00
33 CITY AND COUNTY GOVERNMENT	1.05	2.38	.00	.00	26.93	.00	.68
34 STATE GOVERNMENT	1.83	2.15	.00	1.48	.00	.00	5.86
35 FEDERAL GOVERNMENT	4.43	13.85	.00	.00	1.15	.00	.00
36 IMPORTS	22.81	24.65	23.67	9.28	6.41	.00	3.08
37 TOTAL PURCHASES	100.00	100.00	100.00	100.00	100.00	.00	100.00

TABLE 2. DIRECT REQUIREMENTS PER DOLLAR OF GROSS OUTPUT, N.E.GA. , 1972

(IN PERCENT)

		FINAL DEMAND		
		NET EXPORTS	TOTAL FINAL DEMAND	TOTAL SALES
1	AGRICULTURE (SIC 01, 07-9)	8.94	1.14	2.53
2	MINING (SIC 10-4)	6.54	.65	.50
3	CONTRACT CONSTRUCTION (SIC 15-7)	58.71	12.56	6.13
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	80.96	11.35	5.99
5	TEXTILE MILL PRODUCTS (SIC 22)	75.98	7.75	5.03
6	APPAREL AND RELATED PRODUCTS (SIC 23)	33.68	4.91	2.55
7	LUMBER AND WOOD PRODUCTS (SIC 24)	1.46	.17	.59
8	FURNITURE AND FIXTURES (SIC 25)	3.37	.69	.36
9	PAPER AND ALLIED PRODUCTS (SIC 26)	4.96	.57	.71
10	PRINTING AND PUBLISHING (SIC 27)	.96	.25	.39
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	6.12	.69	.66
12	PETROLEUM REFINING (SIC 29)	7.44	.74	.39
13	RUBBER AND MISC. PLASTICS (SIC 30)	10.84	1.23	.79
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	5.00	.88	.50
15	STONE, CLAY AND GLASS PROD. (SIC 32)	11.25	1.15	.93
16	PRIMARY METAL INDUSTRIES (SIC 33)	12.67	1.26	1.03
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	11.64	1.22	1.21
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	8.60	1.45	.89
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	44.53	4.66	2.30
20	TRANSPORTATION EQUIPMENT (SIC 37)	12.16	3.91	2.17
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	12.33	1.40	.86
22	TRANSPORTATION SERVICES (SIC 40-7)	.00	.47	.90
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	10.52	2.46	1.95
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	7.50	10.09	5.80
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	4.88	5.49	3.13
26	SERVICES (SIC 70-9, 80-6, 89)	43.57	11.47	6.51
27	FEDERAL GOVERNMENT ENTERPRISES	.00	.09	.15
28	STATE & LOCAL GOVERNMENT ENTERPRISES	4.16	.50	.39
29	UNALLOCATED INDUSTRIES	.25	.10	.53
30	TOTAL LOCAL PURCHASES	489.03	89.29	55.88
31	HOUSEHOLDS	88.25	22.21	27.54
32	CAPITAL RESIDUAL	.00	3.43	6.34
33	CITY AND COUNTY GOVERNMENT	.00	3.35	2.07
34	STATE GOVERNMENT	.00	1.88	1.85
35	FEDERAL GOVERNMENT	.00	8.72	6.32
36	IMPORTS	-477.29	-28.88	.00
37	TOTAL PURCHASES	100.00	100.00	100.00

TABLE 3. TOTAL REQUIREMENTS (DIRECT AND INDIRECT) PER DOLLAR OF DELIVERY TO FINAL DEMAND
N.E.GA. , 1972

(EACH ENTRY APPROXIMATES THE TOTAL OUTPUT REQUIRED FROM THE SECTOR AT THE BEGINNING OF EACH ROW FOR EVERY DOLLAR OF DELIVERY TO FINAL DEMAND BY THE SECTOR NUMBERED AT THE HEAD OF EACH COLUMN.)

		PURCHASING INDUSTRY NUMBER (SEE LEFT FOR TITLE)						
	SELLING INDUSTRY	1	2	3	4	5	6	7
1	AGRICULTURE (SIC 01, 07-9)	1.1397	.0013	.0031	.3499	.0105	.0048	.0261
2	MINING (SIC 10-4)	.0007	1.0171	.0169	.0007	.0005	.0002	.0010
3	CONTRACT CONSTRUCTION (SIC 15-7)	.0093	.0138	1.0056	.0068	.0060	.0032	.0092
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	.1855	.0021	.0026	1.1381	.0034	.0024	.0056
5	TEXTILE MILL PRODUCTS (SIC 22)	.0072	.0006	.0028	.0039	1.2476	.2793	.0017
6	APPAREL AND RELATED PRODUCTS (SIC 23)	.0010	.0004	.0014	.0031	.0007	1.1431	.0034
7	LUMBER AND WOOD PRODUCTS (SIC 24)	.0017	.0020	.0466	.0011	.0006	.0004	1.3464
8	FURNITURE AND FIXTURES (SIC 25)	.0001	.0002	.0029	.0001	.0002	.0002	.0027
9	PAPER AND ALLIED PRODUCTS (SIC 26)	.0165	.0057	.0050	.0242	.0185	.0107	.0085
10	PRINTING AND PUBLISHING (SIC 27)	.0014	.0024	.0024	.0039	.0014	.0014	.0018
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	.0032	.0091	.0049	.0036	.0528	.0123	.0054
12	PETROLEUM REFINING (SIC 29)	.0002	.0024	.0089	.0001	.0006	.0002	.0002
13	RUBBER AND MISC. PLASTICS (SIC 30)	.0020	.0110	.0080	.0050	.0021	.0023	.0060
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	.0005	.0001	.0002	.0002	.0002	.0034	.0005
15	STONE, CLAY AND GLASS PROD. (SIC 32)	.0009	.0464	.0505	.0006	.0018	.0006	.0062
16	PRIMARY METAL INDUSTRIES (SIC 33)	.0010	.0067	.0293	.0006	.0005	.0003	.0031
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	.0115	.0063	.0686	.0053	.0010	.0007	.0182
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	.0010	.0118	.0125	.0010	.0027	.0009	.0044
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	.0005	.0042	.0167	.0004	.0005	.0003	.0007
20	TRANSPORTATION EQUIPMENT (SIC 37)	.0007	.0121	.0025	.0006	.0004	.0004	.0011
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	.0003	.0009	.0018	.0004	.0014	.0039	.0016
22	TRANSPORTATION SERVICES (SIC 40-7)	.0181	.0152	.0321	.0269	.0153	.0080	.0320
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	.0073	.0343	.0129	.0089	.0139	.0098	.0163
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	.0330	.0309	.0819	.0275	.0282	.0282	.0261
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	.0086	.0192	.0092	.0061	.0058	.0077	.0098
26	SERVICES (SIC 70-9, 80-6, 89)	.0144	.0350	.0404	.0223	.0202	.0192	.0286
27	FEDERAL GOVERNMENT ENTERPRISES	.0005	.0011	.0011	.0008	.0012	.0021	.0012
28	STATE & LOCAL GOVERNMENT ENTERPRISES	.0011	.0032	.0025	.0015	.0011	.0008	.0019
29	UNALLOCATED INDUSTRIES	.0048	.0144	.0126	.0057	.0070	.0086	.0087
30	TOTAL LOCAL PURCHASES	1.4728	1.3099	1.4861	1.6494	1.4462	1.5554	1.5786

TABLE 3. TOTAL REQUIREMENTS (DIRECT AND INDIRECT) PER DOLLAR OF DELIVERY TO FINAL DEMAND
N.E.GA. , 1972

(EACH ENTRY APPROXIMATES THE TOTAL OUTPUT REQUIRED FROM THE SECTOR AT THE BEGINNING OF EACH ROW FOR EVERY DOLLAR OF DELIVERY TO FINAL DEMAND BY THE SECTOR NUMBERED AT THE HEAD OF EACH COLUMN.)

		PURCHASING INDUSTRY NUMBER (SEE LEFT FOR TITLE)						
	SELLING INDUSTRY	8	9	10	11	12	13	14
1	AGRICULTURE (SIC 01, 07-9)	.0051	.0010	.0015	.0060	.0011	.0010	.0342
2	MINING (SIC 10-4)	.0009	.0071	.0003	.0015	.0422	.0015	.0003
3	CONTRACT CONSTRUCTION (SIC 15-7)	.0067	.0076	.0049	.0093	.0097	.0073	.0049
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	.0029	.0019	.0031	.0173	.0021	.0018	.1091
5	TEXTILE MILL PRODUCTS (SIC 22)	.1286	.0051	.0012	.0023	.0007	.0023	.0269
6	APPAREL AND RELATED PRODUCTS (SIC 23)	.0030	.0028	.0002	.0040	.0012	.0007	.0104
7	LUMBER AND WOOD PRODUCTS (SIC 24)	.1524	.0020	.0024	.0026	.0029	.0054	.0107
8	FURNITURE AND FIXTURES (SIC 25)	1.0182	.0001	.0000	.0001	.0001	.0002	.0001
9	PAPER AND ALLIED PRODUCTS (SIC 26)	.0181	1.0559	.0272	.0229	.0240	.0298	.0191
10	PRINTING AND PUBLISHING (SIC 27)	.0025	.0068	1.0239	.0025	.0025	.0020	.0023
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	.0106	.0115	.0066	1.0594	.0015	.0200	.0072
12	PETROLEUM REFINING (SIC 29)	.0003	.0005	.0001	.0101	1.0013	.0003	.0002
13	RUBBER AND MISC. PLASTICS (SIC 30)	.0374	.0188	.0040	.0242	.0016	1.0017	.0159
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	.0013	.0002	.0002	.0004	.0002	.0003	1.2072
15	STONE, CLAY AND GLASS PROD. (SIC 32)	.0051	.0009	.0004	.0011	.0060	.0055	.0007
16	PRIMARY METAL INDUSTRIES (SIC 33)	.0091	.0006	.0004	.0035	.0012	.0032	.0005
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	.1024	.0033	.0015	.0039	.0016	.0069	.0033
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	.0022	.0007	.0005	.0012	.0012	.0014	.0007
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	.0009	.0005	.0005	.0036	.0007	.0006	.0004
20	TRANSPORTATION EQUIPMENT (SIC 37)	.0057	.0007	.0007	.0008	.0012	.0012	.0006
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	.0026	.0012	.0029	.0083	.0008	.0066	.0066
22	TRANSPORTATION SERVICES (SIC 40-7)	.0251	.0319	.0112	.0272	.0369	.0165	.0133
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	.0167	.0148	.0172	.0352	.0193	.0170	.0116
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	.0417	.0254	.0183	.0296	.0637	.0270	.0286
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	.0146	.0090	.0132	.0092	.0111	.0082	.0081
26	SERVICES (SIC 70-9, 80-6, 89)	.0378	.0309	.0352	.0376	.0591	.0288	.0319
27	FEDERAL GOVERNMENT ENTERPRISES	.0018	.0013	.0046	.0012	.0015	.0012	.0026
28	STATE & LOCAL GOVERNMENT ENTERPRISES	.0018	.0017	.0011	.0018	.0025	.0013	.0012
29	UNALLOCATED INDUSTRIES	.0141	.0122	.0175	.0128	.0126	.0103	.0100
30	TOTAL LOCAL PURCHASES	1.6694	1.2565	1.2009	1.3393	1.2903	1.2099	1.5685

TABLE 3. TOTAL REQUIREMENTS (DIRECT AND INDIRECT) PER DOLLAR OF DELIVERY TO FINAL DEMAND
N.E.GA. , 1972

(EACH ENTRY APPROXIMATES THE TOTAL OUTPUT REQUIRED FROM THE SECTOR AT THE BEGINNING OF EACH ROW FOR EVERY DOLLAR OF DELIVERY TO FINAL DEMAND BY THE SECTOR NUMBERED AT THE HEAD OF EACH COLUMN.)

		PURCHASING INDUSTRY NUMBER (SEE LEFT FOR TITLE)						
	SELLING INDUSTRY	15	16	17	18	19	20	21
1	AGRICULTURE (SIC 01, 07-9)	.0014	.0010	.0011	.0018	.0011	.0016	.0028
2	MINING (SIC 10-4)	.1257	.0010	.0016	.0004	.0022	.0012	.0009
3	CONTRACT CONSTRUCTION (SIC 15-7)	.0115	.0055	.0050	.0042	.0045	.0042	.0064
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	.0026	.0017	.0018	.0035	.0021	.0016	.0064
5	TEXTILE MILL PRODUCTS (SIC 22)	.0011	.0040	.0055	.0016	.0056	.0080	.0121
6	APPAREL AND RELATED PRODUCTS (SIC 23)	.0023	.0009	.0012	.0013	.0015	.0071	.0029
7	LUMBER AND WOOD PRODUCTS (SIC 24)	.0104	.0097	.0068	.0196	.0036	.0475	.0162
8	FURNITURE AND FIXTURES (SIC 25)	.0007	.0001	.0013	.0003	.0001	.0139	.0016
9	PAPER AND ALLIED PRODUCTS (SIC 26)	.0058	.0080	.0149	.0097	.0199	.0031	.0171
10	PRINTING AND PUBLISHING (SIC 27)	.0031	.0017	.0020	.0021	.0024	.0017	.0046
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	.0109	.0025	.0035	.0033	.0036	.0027	.0040
12	PETROLEUM REFINING (SIC 29)	.0008	.0001	.0004	.0001	.0001	.0006	.0002
13	RUBBER AND MISC. PLASTICS (SIC 30)	.0071	.0013	.0039	.0142	.0152	.0172	.0240
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	.0004	.0002	.0002	.0013	.0003	.0003	.0145
15	STONE, CLAY AND GLASS PROD. (SIC 32)	1.0207	.0008	.0108	.0016	.0156	.0082	.0050
16	PRIMARY METAL INDUSTRIES (SIC 33)	.0050	1.0908	.0558	.0278	.0692	.0184	.0088
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	.0101	.0083	1.0281	.0285	.0148	.0430	.0102
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	.0034	.0048	.0074	1.1080	.0054	.0167	.0027
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	.0012	.0006	.0030	.0348	1.0327	.0052	.0075
20	TRANSPORTATION EQUIPMENT (SIC 37)	.0030	.0050	.0086	.0150	.0023	1.1919	.0075
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	.0014	.0010	.0023	.0092	.0129	.0111	1.1900
22	TRANSPORTATION SERVICES (SIC 40-7)	.0486	.0188	.0165	.0107	.0150	.0161	.0119
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	.0274	.0150	.0140	.0119	.0134	.0079	.0180
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	.0303	.0219	.0254	.0250	.0326	.0205	.0535
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	.0102	.0054	.0095	.0098	.0089	.0050	.0103
26	SERVICES (SIC 70-9, 80-6, 89)	.0433	.0180	.0249	.0258	.0303	.0246	.0696
27	FEDERAL GOVERNMENT ENTERPRISES	.0016	.0008	.0012	.0015	.0013	.0011	.0026
28	STATE & LOCAL GOVERNMENT ENTERPRISES	.0031	.0012	.0012	.0010	.0012	.0010	.0015
29	UNALLOCATED INDUSTRIES	.0191	.0127	.0134	.0138	.0155	.0107	.0190
30	TOTAL LOCAL PURCHASES	1.4123	1.2428	1.2712	1.3879	1.3333	1.4923	1.5316

TABLE 3. TOTAL REQUIREMENTS (DIRECT AND INDIRECT) PER DOLLAR OF DELIVERY TO FINAL DEMAND
N.E.GA. , 1972

(EACH ENTRY APPROXIMATES THE TOTAL OUTPUT REQUIRED FROM THE SECTOR AT THE BEGINNING OF EACH ROW FOR EVERY DOLLAR OF DELIVERY TO FINAL DEMAND BY THE SECTOR NUMBERED AT THE HEAD OF EACH COLUMN.)

		PURCHASING INDUSTRY NUMBER (SEE LEFT FOR TITLE)						
	SELLING INDUSTRY	22	23	24	25	26	27	28
1	AGRICULTURE (SIC 01, 07-9)	.0015	.0008	.0044	.0312	.0029	.0010	.0015
2	MINING (SIC 10-4)	.0012	.0008	.0008	.0024	.0007	.0003	.0047
3	CONTRACT CONSTRUCTION (SIC 15-7)	.0642	.0427	.0086	.0545	.0291	.0125	.2759
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	.0019	.0013	.0096	.0082	.0053	.0018	.0015
5	TEXTILE MILL PRODUCTS (SIC 22)	.0006	.0007	.0030	.0043	.0011	.0024	.0010
6	APPAREL AND RELATED PRODUCTS (SIC 23)	.0008	.0005	.0024	.0022	.0010	.0014	.0008
7	LUMBER AND WOOD PRODUCTS (SIC 24)	.0034	.0021	.0020	.0035	.0020	.0008	.0129
8	FURNITURE AND FIXTURES (SIC 25)	.0002	.0001	.0004	.0003	.0002	.0001	.0008
9	PAPER AND ALLIED PRODUCTS (SIC 26)	.0017	.0009	.0099	.0023	.0038	.0011	.0018
10	PRINTING AND PUBLISHING (SIC 27)	.0032	.0022	.0031	.0044	.0353	.0044	.0025
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	.0011	.0006	.0014	.0038	.0029	.0004	.0043
12	PETROLEUM REFINING (SIC 29)	.0006	.0004	.0015	.0008	.0003	.0001	.0025
13	RUBBER AND MISC. PLASTICS (SIC 30)	.0062	.0009	.0028	.0019	.0030	.0017	.0029
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	.0001	.0001	.0005	.0004	.0003	.0002	.0001
15	STONE, CLAY AND GLASS PROD. (SIC 32)	.0035	.0025	.0028	.0040	.0024	.0008	.0139
16	PRIMARY METAL INDUSTRIES (SIC 33)	.0039	.0017	.0011	.0023	.0015	.0007	.0081
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	.0064	.0031	.0038	.0053	.0043	.0014	.0190
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	.0019	.0008	.0021	.0039	.0039	.0005	.0038
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	.0031	.0010	.0028	.0045	.0025	.0006	.0048
20	TRANSPORTATION EQUIPMENT (SIC 37)	.0043	.0007	.0018	.0019	.0078	.0031	.0018
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	.0006	.0004	.0024	.0011	.0043	.0005	.0008
22	TRANSPORTATION SERVICES (SIC 40-7)	1.0575	.0161	.0055	.0078	.0095	.0962	.0127
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	.0174	1.1038	.0204	.0177	.0537	.0097	.0457
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	.0278	.0114	1.0125	.0283	.0292	.0113	.0278
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	.0160	.0085	.0225	1.0865	.0354	.0124	.0104
26	SERVICES (SIC 70-9, 80-6, 89)	.0440	.0420	.0423	.0576	1.0587	.0268	.0533
27	FEDERAL GOVERNMENT ENTERPRISES	.0019	.0028	.0044	.0056	.0081	1.0005	.0011
28	STATE & LOCAL GOVERNMENT ENTERPRISES	.0326	.0111	.0072	.0219	.0046	.0039	1.0019
29	UNALLOCATED INDUSTRIES	.0089	.0099	.0094	.0098	.0271	.0145	.0086
30	TOTAL LOCAL PURCHASES	1.3165	1.2700	1.1913	1.3787	1.3411	1.2110	1.5269

TABLE 3. TOTAL REQUIREMENTS (DIRECT AND INDIRECT) PER DOLLAR OF DELIVERY TO FINAL DEMAND
N.E.GA. , 1972

(EACH ENTRY APPROXIMATES THE TOTAL OUTPUT REQUIRED FROM THE SECTOR AT THE BEGINNING OF EACH ROW FOR EVERY DOLLAR OF DELIVERY TO FINAL DEMAND BY THE SECTOR NUMBERED AT THE HEAD OF EACH COLUMN.)

	SELLING INDUSTRY	PURCHASING INDUSTRY NUMBER (SEE LEFT FOR TITLE) 29
1	AGRICULTURE (SIC 01, 07-9)	.0384
2	MINING (SIC 10-4)	.0007
3	CONTRACT CONSTRUCTION (SIC 15-7)	.0101
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	.1067
5	TEXTILE MILL PRODUCTS (SIC 22)	.0074
6	APPAREL AND RELATED PRODUCTS (SIC 23)	.0020
7	LUMBER AND WOOD PRODUCTS (SIC 24)	.0023
8	FURNITURE AND FIXTURES (SIC 25)	.0002
9	PAPER AND ALLIED PRODUCTS (SIC 26)	.0464
10	PRINTING AND PUBLISHING (SIC 27)	.0887
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	.0026
12	PETROLEUM REFINING (SIC 29)	.0002
13	RUBBER AND MISC. PLASTICS (SIC 30)	.0037
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	.0045
15	STONE, CLAY AND GLASS PROD. (SIC 32)	.0015
16	PRIMARY METAL INDUSTRIES (SIC 33)	.0046
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	.0059
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	.0056
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	.0047
20	TRANSPORTATION EQUIPMENT (SIC 37)	.0120
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	.0205
22	TRANSPORTATION SERVICES (SIC 40-7)	.0750
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	.0129
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	.0611
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	.0093
26	SERVICES (SIC 70-9, 80-6, 89)	.1569
27	FEDERAL GOVERNMENT ENTERPPISES	.0020
28	STATE & LOCAL GOVERNMENT ENTERPRISES	.0034
29	UNALLOCATED INDUSTRIES	1.0079
30	TOTAL LOCAL PURCHASES	1.6973

TABLE 4. TOTAL REQUIREMENTS (DIRECT, INDIRECT, AND INDUCED) PER DOLLAR OF DELIVERY TO FINAL DEMAND, N.E.GA., 1972

(EACH ENTRY APPROXIMATES THE TOTAL OUTPUT REQUIRED FROM THE SECTOR AT THE BEGINNING OF EACH ROW FOR EVERY DOLLAR OF DELIVERY TO FINAL DEMAND BY THE SECTOR NUMBERED AT THE HEAD OF EACH COLUMN.)

	SELLING INDUSTRY	PURCHASING INDUSTRY NUMBER (SEE LEFT FOR TITLE) 1	2	3	4	5	6	7
1	AGRICULTURE (SIC 01, 07-9)	1.1572	.0149	.0186	.3628	.0261	.0284	.0424
2	MINING (SIC 10-4)	.0011	1.0174	.0173	.0010	.0009	.0008	.0014
3	CONTRACT CONSTRUCTION (SIC 15-7)	.0166	.0194	1.0121	.0122	.0125	.0131	.0159
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	.2273	.0346	.0396	1.1690	.0407	.0588	.0445
5	TEXTILE MILL PRODUCTS (SIC 22)	.0163	.0077	.0109	.0107	1.2958	.2916	.0102
6	APPAREL AND RELATED PRODUCTS (SIC 23)	.0204	.0155	.0187	.0175	.0181	1.1693	.0215
7	LUMBER AND WOOD PRODUCTS (SIC 24)	.0044	.0041	.0490	.0030	.0030	.0040	1.3489
8	FURNITURE AND FIXTURES (SIC 25)	.0039	.0032	.0063	.0029	.0037	.0054	.0062
9	PAPER AND ALLIED PRODUCTS (SIC 26)	.0201	.0085	.0082	.0269	.0217	.0155	.0118
10	PRINTING AND PUBLISHING (SIC 27)	.0062	.0061	.0067	.0074	.0056	.0079	.0062
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	.0051	.0106	.0066	.0050	.0545	.0148	.0072
12	PETROLEUM REFINING (SIC 29)	.0004	.0026	.0091	.0003	.0008	.0005	.0005
13	RUBBER AND MISC. PLASTICS (SIC 30)	.0050	.0134	.0107	.0072	.0049	.0065	.0089
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	.0055	.0040	.0046	.0039	.0046	.0102	.0052
15	STONE, CLAY AND GLASS PROD. (SIC 32)	.0022	.0474	.0517	.0016	.0030	.0024	.0074
16	PRIMARY METAL INDUSTRIES (SIC 33)	.0020	.0074	.0302	.0013	.0014	.0016	.0040
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	.0146	.0087	.0713	.0075	.0038	.0048	.0211
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	.0026	.0130	.0139	.0021	.0041	.0030	.0059
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	.0019	.0053	.0180	.0014	.0018	.0022	.0020
20	TRANSPORTATION EQUIPMENT (SIC 37)	.0283	.0335	.0270	.0211	.0251	.0377	.0268
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	.0026	.0026	.0038	.0021	.0034	.0070	.0037
22	TRANSPORTATION SERVICES (SIC 40-7)	.0265	.0217	.0395	.0331	.0227	.0193	.0398
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	.0296	.0517	.0327	.0254	.0338	.0399	.0371
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	.1372	.1120	.1744	.1047	.1214	.1692	.1233
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	.0694	.0666	.0632	.0512	.0602	.0900	.0665
26	SERVICES (SIC 70-9, 80-6, 89)	.0994	.1012	.1159	.0854	.0962	.1342	.1079
27	FEDERAL GOVERNMENT ENTERPRISES	.0027	.0028	.0031	.0024	.0032	.0051	.0032
28	STATE & LOCAL GOVERNMENT ENTERPRISES	.0045	.0058	.0056	.0040	.0042	.0054	.0050
29	UNALLOCATED INDUSTRIES	.0091	.0177	.0164	.0089	.0109	.0144	.0128
30	HOUSEHOLDS	.6492	.5055	.5767	.4814	.5809	.8788	.6056
31	TOTAL LOCAL PURCHASES	2.5709	2.1649	2.4616	2.4637	2.4289	3.0418	2.6029

TABLE 4. TOTAL REQUIREMENTS (DIRECT, INDIRECT, AND INDUCED) PER DOLLAR OF DELIVERY TO FINAL DEMAND, N.E.GA., 1972

(EACH ENTRY APPROXIMATES THE TOTAL OUTPUT REQUIRED FROM THE SECTOR AT THE BEGINNING OF EACH ROW FOR EVERY DOLLAR OF DELIVERY TO FINAL DEMAND BY THE SECTOR NUMBERED AT THE HEAD OF EACH COLUMN.)

		PURCHASING INDUSTRY NUMBER (SEE LEFT FOR TITLE)						
	SELLING INDUSTRY	8	9	10	11	12	13	14
1	AGRICULTURE (SIC 01, 07-9)	.0223	.0120	.0204	.0199	.0141	.0140	.0527
2	MINING (SIC 10-4)	.0013	.0073	.0007	.0018	.0425	.0018	.0008
3	CONTRACT CONSTRUCTION (SIC 15-7)	.0139	.0121	.0128	.0151	.0151	.0128	.0126
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	.0440	.0281	.0483	.0504	.0331	.0330	.1532
5	TEXTILE MILL PRODUCTS (SIC 22)	.1376	.0108	.0111	.0095	.0075	.0091	.0365
6	APPAREL AND RELATED PRODUCTS (SIC 23)	.0220	.0150	.0212	.0194	.0156	.0152	.0309
7	LUMBER AND WOOD PRODUCTS (SIC 24)	.1550	.0036	.0052	.0047	.0049	.0074	.0135
8	FURNITURE AND FIXTURES (SIC 25)	1.0219	.0025	.0042	.0031	.0029	.0031	.0041
9	PAPER AND ALLIED PRODUCTS (SIC 26)	.0216	1.0581	.0310	.0257	.0266	.0325	.0228
10	PRINTING AND PUBLISHING (SIC 27)	.0072	.0098	1.0291	.0063	.0060	.0055	.0073
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	.0124	.0127	.0086	1.0609	.0029	.0214	.0092
12	PETROLEUM REFINING (SIC 29)	.0005	.0007	.0004	.0103	1.0014	.0005	.0004
13	RUBBER AND MISC. PLASTICS (SIC 30)	.0405	.0207	.0073	.0266	.0038	1.0040	.0192
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	.0062	.0034	.0056	.0044	.0039	.0040	1.2125
15	STONE, CLAY AND GLASS PROD. (SIC 32)	.0064	.0018	.0018	.0021	.0070	.0065	.0021
16	PRIMARY METAL INDUSTRIES (SIC 33)	.0101	.0012	.0014	.0042	.0019	.0049	.0015
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	.1054	.0053	.0048	.0063	.0039	.0092	.0066
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	.0038	.0017	.0022	.0025	.0024	.0026	.0024
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	.0022	.0013	.0020	.0047	.0017	.0016	.0019
20	TRANSPORTATION EQUIPMENT (SIC 37)	.0329	.0180	.0306	.0227	.0217	.0218	.0298
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	.0048	.0026	.0053	.0101	.0024	.0083	.0090
22	TRANSPORTATION SERVICES (SIC 40-7)	.0333	.0372	.0203	.0338	.0431	.0227	.0221
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	.0386	.0288	.0413	.0529	.0358	.0337	.0352
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	.1443	.0908	.1311	.1123	.1412	.1049	.1388
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	.0745	.0472	.0791	.0575	.0564	.0537	.0725
26	SERVICES (SIC 70-9, 80-6, 89)	.1215	.0843	.1273	.1051	.1023	.0924	.1219
27	FEDERAL GOVERNMENT ENTERPRISES	.0040	.0026	.0070	.0029	.0031	.0028	.0049
28	STATE & LOCAL GOVERNMENT ENTERPRISES	.0051	.0038	.0048	.0045	.0050	.0038	.0048
29	UNALLOCATED INDUSTRIES	.0183	.0149	.0222	.0162	.0158	.0135	.0145
30	HOUSEHOLDS	.6394	.4077	.7031	.5158	.4826	.4855	.6868
31	TOTAL LOCAL PURCHASES	2.7509	1.9461	2.3903	2.2117	2.1066	2.0311	2.7303

TABLE 4. TOTAL REQUIREMENTS (DIRECT, INDIRECT, AND INDUCED) PER DOLLAR OF DELIVERY TO FINAL DEMAND, N.E.GA. , 1972

(EACH ENTRY APPROXIMATES THE TOTAL OUTPUT REQUIRED FROM THE SECTOR AT THE BEGINNING OF EACH ROW FOR EVERY DOLLAR OF DELIVERY TO FINAL DEMAND BY THE SECTOR NUMBERED AT THE HEAD OF EACH COLUMN.)

		PURCHASING INDUSTRY NUMBER (SEE LEFT FOR TITLE)						
	SELLING INDUSTRY	15	16	17	18	19	20	21
1	AGRICULTURE (SIC 01, 07-9)	.0194	.0131	.0143	.0167	.0167	.0140	.0192
2	MINING (SIC 10-4)	.1261	.0012	.0019	.0007	.0025	.0014	.0012
3	CONTRACT CONSTRUCTION (SIC 15-7)	.0190	.0105	.0105	.0104	.0110	.0093	.0132
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	.0455	.0306	.0334	.0391	.0394	.0312	.0456
5	TEXTILE MILL PRODUCTS (SIC 22)	.0104	.0103	.0124	.0094	.0138	.0145	.0206
6	APPAREL AND RELATED PRODUCTS (SIC 23)	.0222	.0144	.0159	.0178	.0188	.0208	.0211
7	LUMBER AND WOOD PRODUCTS (SIC 24)	.0131	.0116	.0088	.0218	.0059	.0494	.0187
8	FURNITURE AND FIXTURES (SIC 25)	.0047	.0028	.0042	.0036	.0035	.0167	.0052
9	PAPER AND ALLIED PRODUCTS (SIC 26)	.0094	.0105	.0176	.0127	.0230	.0056	.0204
10	PRINTING AND PUBLISHING (SIC 27)	.0080	.0050	.0056	.0061	.0067	.0051	.0091
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	.0128	.0038	.0049	.0049	.0052	.0040	.0057
12	PETROLEUM REFINING (SIC 29)	.0011	.0003	.0006	.0003	.0004	.0007	.0004
13	RUBBER AND MISC. PLASTICS (SIC 30)	.0103	.0035	.0062	.0168	.0179	.0194	.0269
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	.0055	.0037	.0040	.0055	.0048	.0038	.0192
15	STONE, CLAY AND GLASS PROD. (SIC 32)	1.0220	.0017	.0118	.0028	.0168	.0092	.0062
16	PRIMARY METAL INDUSTRIES (SIC 33)	.0060	1.0915	.0565	.0286	.0700	.0190	.0097
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	.0133	.0105	1.0304	.0312	.0176	.0452	.0131
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	.0050	.0059	.0086	1.1094	.0068	.0178	.0042
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	.0027	.0015	.0040	.0360	1.0339	.0062	.0088
20	TRANSPORTATION EQUIPMENT (SIC 37)	.0313	.0241	.0294	.0385	.0269	1.2115	.0334
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	.0037	.0026	.0040	.0111	.0149	.0127	1.1921
22	TRANSPORTATION SERVICES (SIC 40-7)	.0572	.0246	.0228	.0179	.0224	.0221	.0108
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	.0503	.0304	.0308	.0308	.0333	.0237	.0389
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	.1373	.0942	.1041	.1138	.1255	.0943	.1514
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	.0727	.0477	.0555	.0616	.0632	.0481	.0675
26	SERVICES (SIC 70-9, 80-6, 89)	.1306	.0770	.0892	.0983	.1061	.0849	.1496
27	FEDERAL GOVERNMENT ENTERPRISES	.0039	.0023	.0029	.0033	.0032	.0026	.0047
28	STATE & LOCAL GOVERNMENT ENTERPRISES	.0066	.0036	.0038	.0039	.0043	.0034	.0047
29	UNALLOCATED INDUSTRIES	.0235	.0157	.0166	.0174	.0193	.0138	.0231
30	HOUSEHOLDS	.6667	.4507	.4906	.5532	.5793	.4599	.6107
31	TOTAL LOCAL PURCHASES	2.5400	2.0051	2.1010	2.3236	2.3133	2.2702	2.5646

TABLE 4. TOTAL REQUIREMENTS (DIRECT, INDIRECT, AND INDUCED) PER DOLLAR OF DELIVERY TO FINAL DEMAND, N.E.GA., 1972

(EACH ENTRY APPROXIMATES THE TOTAL OUTPUT REQUIRED FROM THE SECTOR AT THE BEGINNING OF EACH ROW FOR EVERY DOLLAR OF DELIVERY TO FINAL DEMAND BY THE SECTOR NUMBERED AT THE HEAD OF EACH COLUMN.)

		PURCHASING INDUSTRY NUMBER (SEE LEFT FOR TITLE)						
	SELLING INDUSTRY	22	23	24	25	26	27	28
1	AGRICULTURE (SIC 01, 07-9)	.0243	.0144	.0245	.0480	.0200	.0306	.0125
2	MINING (SIC 10-4)	.0017	.0011	.0012	.0027	.0011	.0009	.0049
3	CONTRACT CONSTRUCTION (SIC 15-7)	.0737	.0483	.0169	.0615	.0362	.0247	.2804
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	.0564	.0339	.0578	.0482	.0462	.0723	.0276
5	TEXTILE MILL PRODUCTS (SIC 22)	.0125	.0078	.0135	.0131	.0100	.0178	.0067
6	APPAREL AND RELATED PRODUCTS (SIC 23)	.0261	.0156	.0248	.0208	.0200	.0341	.0130
7	LUMBER AND WOOD PRODUCTS (SIC 24)	.0069	.0042	.0051	.0060	.0046	.0053	.0145
8	FURNITURE AND FIXTURES (SIC 25)	.0053	.0031	.0049	.0040	.0040	.0066	.0032
9	PAPER AND ALLIED PRODUCTS (SIC 26)	.0062	.0037	.0140	.0057	.0072	.0070	.0041
10	PRINTING AND PUBLISHING (SIC 27)	.0095	.0059	.0086	.0090	.0400	.0124	.0055
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	.0035	.0021	.0036	.0056	.0047	.0036	.0054
12	PETROLEUM REFINING (SIC 29)	.0009	.0006	.0018	.0011	.0006	.0006	.0026
13	RUBBER AND MISC. PLASTICS (SIC 30)	.0102	.0033	.0063	.0049	.0060	.0068	.0049
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	.0066	.0040	.0062	.0052	.0052	.0087	.0032
15	STONE, CLAY AND GLASS PROD. (SIC 32)	.0053	.0035	.0043	.0053	.0037	.0030	.0148
16	PRIMARY METAL INDUSTRIES (SIC 33)	.0051	.0025	.0022	.0033	.0024	.0023	.0087
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	.0105	.0055	.0074	.0083	.0073	.0067	.0209
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	.0043	.0020	.0039	.0054	.0055	.0032	.0048
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	.0050	.0021	.0044	.0059	.0039	.0030	.0057
20	TRANSPORTATION EQUIPMENT (SIC 37)	.0403	.0223	.0336	.0283	.0348	.0496	.0191
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	.0035	.0022	.0050	.0033	.0065	.0043	.0022
22	TRANSPORTATION SERVICES (SIC 41-7)	1.0684	.0226	.0152	.0158	.0177	.1103	.0179
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	.0465	1.1212	.0461	.0391	.0756	.0473	.0597
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	.1639	.0927	1.1328	.1282	.1513	.1874	.0931
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	.0954	.0560	.0927	1.1448	.0950	.1151	.0485
26	SERVICES (SIC 70-9, 80-6, 89)	.1551	.1084	.1405	.1391	1.1420	.1704	.1066
27	FEDERAL GOVERNMENT ENTERPRISES	.0047	.0045	.0069	.0077	.0102	1.0042	.0025
28	STATE & LOCAL GOVERNMENT ENTERPRISES	.0371	.0137	.0112	.0251	.0080	.0096	1.0040
29	UNALLOCATED INDUSTRIES	.0145	.0133	.0144	.0139	.0313	.0218	.0113
30	HOUSEHOLDS	.8483	.5071	.7498	.6226	.6363	1.0971	.4069
31	TOTAL LOCAL PURCHASES	2.7513	2.1278	2.4596	2.4319	2.4174	3.0667	2.2152

TABLE 4. TOTAL REQUIREMENTS (DIRECT, INDIRECT, AND INDUCED) PER DOLLAR OF DELIVERY TO FINAL DEMAND, N.E.GA. , 1972

(EACH ENTRY APPROXIMATES THE TOTAL OUTPUT REQUIRED FROM THE SECTOR AT THE BEGINNING OF EACH ROW FOR EVERY DOLLAR OF DELIVERY TO FINAL DEMAND BY THE SECTOR NUMBERED AT THE HEAD OF EACH COLUMN.)

		PURCHASING INDUSTRY NUMBER (SEE LEFT FOR TITLE)	
	SELLING INDUSTRY	29	30
1	AGRICULTURE (SIC 01, 07-9)	.0471	.0360
2	MINING (SIC 10-4)	.0009	.0008
3	CONTRACT CONSTRUCTION (SIC 15-7)	.0137	.0150
4	FOOD AND KINDRED PRODUCTS (SIC 20-1)	.1275	.0860
5	TEXTILE MILL PRODUCTS (SIC 22)	.0119	.0188
6	APPAREL AND RELATED PRODUCTS (SIC 23)	.0117	.0399
7	LUMBER AND WOOD PRODUCTS (SIC 24)	.0036	.0055
8	FURNITURE AND FIXTURES (SIC 25)	.0021	.0079
9	PAPER AND ALLIED PRODUCTS (SIC 26)	.0482	.0072
10	PRINTING AND PUBLISHING (SIC 27)	.0911	.0098
11	CHEMICALS AND ALLIED PRODUCTS (SIC 28)	.0036	.0039
12	PETROLEUM REFINING (SIC 29)	.0003	.0005
13	RUBBER AND MISC. PLASTICS (SIC 30)	.0052	.0063
14	LEATHER AND LEATHER PRODUCTS (SIC 31)	.0070	.0103
15	STONE, CLAY AND GLASS PROD. (SIC 32)	.0022	.0027
16	PRIMARY METAL INDUSTRIES (SIC 33)	.0051	.0020
17	FABRICATED METAL PRODUCTS (SIC 34, 19)	.0075	.0064
18	MACHINERY, EXCEPT ELECTRICAL (SIC 35)	.0064	.0032
19	ELECTRICAL MACHINERY & EQUIP (SIC 36)	.0054	.0029
20	TRANSPORTATION EQUIPMENT (SIC 37)	.0258	.0568
21	MISCELLANEOUS MANUFACTURING (SIC 38-9)	.0216	.0046
22	TRANSPORTATION SERVICES (SIC 40-7)	.0792	.0172
23	COMMUNICATIONS & UTILITIES (SIC 48-9)	.0240	.0459
24	WHOLESALE AND RETAIL TRADE (SIC 50-9)	.1131	.2147
25	FINANCE, INS., REAL ESTATE (SIC 60-7)	.0397	.1253
26	SERVICES (SIC 70-9, 80-6, 89)	.1993	.1752
27	FEDERAL GOVERNMENT ENTERPRISES	.0031	.0045
28	STATE & LOCAL GOVERNMENT ENTERPRISES	.0051	.0070
29	UNALLOCATED INDUSTRIES	1.0100	.0089
30	HOUSEHOLDS	.3240	1.3380
31	TOTAL LOCAL PURCHASES	2.2454	2.2633

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